

RCRA Facility Investigation (RFI) Phase I Report

Volume 1

**Waste Management of Ohio, Inc.
Vickery, Ohio**

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TABLE OF CONTENTS

<u>Section</u>	<u>Page Number</u>
VOLUME 1	
EXECUTIVE SUMMARY	Page 1 of 8
GLOSSARY	Page 1 of 2
1.0 INTRODUCTION.....	Page 1 of 4
1.1 Project Objectives	Page 1 of 4
1.2 Site Background.....	Page 2 of 4
1.2.1 Site Location and Setting.....	Page 2 of 4
1.2.2 Site History	Page 2 of 4
1.2.3 Present Conditions	Page 3 of 4
1.2.4 Previous Investigations and Reports.....	Page 3 of 4
1.2.5 Future Activities	Page 4 of 4
2.0 SITE DESCRIPTION.....	Page 1 of 3
2.1 General Information.....	Page 1 of 3
2.2 Site Geology and Soils.....	Page 1 of 3
2.2.1 Bedrock	Page 1 of 3
2.2.2 Glacial Deposits	Page 1 of 3
3.0 HYDROGEOLOGY.....	Page 1 of 3
3.1 Previous Investigations	Page 1 of 3
3.1.1 Groundwater Flow in the Bedrock.....	Page 1 of 3
3.1.2 Groundwater Flow in the Surficial Deposits.....	Page 2 of 3
4.0 INVESTIGATIVE PROCEDURES.....	Page 1 of 20
4.1 Identification of SWMUs and AOCs.....	Page 1 of 20
4.2 Field Sampling Plan.....	Page 1 of 20
4.2.1 Data Quality Objectives.....	Page 1 of 20
4.2.2 Approval by EPA	Page 3 of 20
4.2.3 Sample Collection Methods.....	Page 3 of 20
4.3 Sampling Procedures.....	Page 3 of 20
4.3.1 Preliminary Sampling Activities.....	Page 4 of 20
4.3.2 Soil and Sediment Sample Collection Procedures.....	Page 6 of 20
4.3.2.1 Select Location Sampling Procedures.....	Page 7 of 20
4.3.2.2 Grid Node Sampling Procedures.....	Page 8 of 20
4.3.3 Surface Soil Sample Collection Procedures.....	Page 10 of 20
4.3.4 Sediment Sample Collection Procedures.....	Page 10 of 20
4.4 Groundwater Sampling	Page 11 of 20

TABLE OF CONTENTS
(Continued)

Section	Page Number
4.5 Analytical Parameters	Page 12 of 20
4.6 Sample Custody	Page 13 of 20
4.7 Quality Control Sample Collection.....	Page 13 of 20
4.7.1 QC Samples.....	Page 14 of 20
4.7.2 Field Instrument QC.....	Page 15 of 20
4.8 Data Validation	Page 15 of 20
4.9 Potable Water Supply.....	Page 16 of 20
4.10 Decontamination Procedures	Page 16 of 20
4.10.1 Decontamination Area	Page 16 of 20
4.10.2 Decontamination Procedures	Page 16 of 20
4.10.3 Investigation-Derived Wastes.....	Page 17 of 20
4.11 Geophysical Investigation.....	Page 17 of 20
4.12 Health and Safety Procedures	Page 19 of 20
4.13 Borehole Abandonment Procedures.....	Page 20 of 20
5.0 RESULTS AND FINDINGS	Page 1 of 33
5.1 Standards for Comparison.....	Page 1 of 33
5.2 Background Soil Sampling	Page 2 of 33
5.3 Solid Waste Management Units.....	Page 2 of 33
5.3.1 SWMU Group A.....	Page 3 of 33
5.3.2 SWMU Group B	Page 6 of 33
5.3.3 SWMU Group C	Page 8 of 33
5.3.4 SWMU Group D.....	Page 10 of 33
5.3.5 SWMU Group E.....	Page 12 of 33
5.3.6 SWMU Group F.....	Page 13 of 33
5.3.7 SWMU Group G.....	Page 15 of 33
5.3.8 SWMU Group H.....	Page 17 of 33
5.3.9 SWMU Group I.....	Page 19 of 33
5.4 Areas of Concern	Page 24 of 33
5.4.1 AOC A - Emergency Drain Tanks.....	Page 24 of 33
5.4.2 AOC B - North Parking Lot - Truck Unloading Facility.....	Page 25 of 33
5.4.3 AOC C - Pug Mill Staging Area (Hay Mill).....	Page 26 of 33
5.4.4 AOC D - Borrow Pit #1	Page 26 of 33
5.4.5 AOC E - Borrow Pit #2.....	Page 27 of 33
5.4.6 AOC F - Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale	Page 27 of 33
5.4.7 AOC G - Roll-Off Staging Pad.....	Page 28 of 33
5.4.8 AOC H - Facility Aboveground Transfer Piping.....	Page 28 of 33

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Page Number</u>
5.4.9 AOC I - Remaining Underground Piping	Page 30 of 33
5.4.10 AOC J - Area Around Monitoring Well L-19.....	Page 32 of 33
5.5 Geotechnical Soil Samples.....	Page 32 of 33
5.6 Supplemental Groundwater Data.....	Page 32 of 33
6.0 COMMUNITY RELATIONS	Page 1 of 1
6.1 Public Information Committee.....	Page 1 of 1
6.2 Fact Sheet and Information Repository.....	Page 1 of 1
7.0 CONCLUSIONS	Page 1 of 8
7.1 Site Conditions.....	Page 1 of 8
7.2 General Conclusions	Page 1 of 8
7.2.1 Conclusions for Individual SWMUs	Page 3 of 8
7.2.2 Conclusions for Individual AOCs	Page 6 of 8
7.2.3 Conclusions for Supplemental Groundwater Data.....	Page 8 of 8
8.0 REFERENCES	Page 1 of 1

VOLUME 2

LIST OF TABLES

<u>Table Number</u>	
4-1	Summary of Solid Waste Management Units/Areas of Concern
4-2	Appendix IX Parameter List (40 CFR 264)
4-3	Analytical Methods, Holding Times and Preservation Methods
4-4	Clyde Water Supply Data (Decontamination Water)
5-1	Project Standards
5-2	Background Metals Data
5-3	Geotechnical Data

LIST OF FIGURES

Figure Number

- 1-1 Site Location Plan
- 1-2 Former Surface Impoundment Locations
- 1-3 Existing Facility Features
- 1-4 Locations of Solid Waste Management Units
- 1-5 Locations Of Areas Of Concern
- 2-1 Geologic Cross Sections
- 3-1 Groundwater Monitoring System Well Locations
- 4-1 Locations of Solid Waste Management Unit Groups and Areas of Concern
- 5-1 [Reserved]
- 5-2 [Reserved]
- 5-2.1a Background Soil Sample Location Map**
- 5-2.1b Background Soil Sample Analytical Results Map
- 5-2.1c Background Soil Sample Analytical Results Map
- 5-3.1a Solid Waste Management Unit Group A (01, 02, 03, 08 & 16) Location Map**
- 5-3.1b Solid Waste Management Unit 01 Analytical Results Map
- 5-3.1c Solid Waste Management Unit 02 Analytical Results Map
- 5-3.1d Solid Waste Management Unit 03 Analytical Results Map
- 5-3.1e Solid Waste Management Unit 08 Analytical Results Map
- 5-3.1f Solid Waste Management Unit 16 Analytical Results Map
- 5-3.1g Solid Waste Management Unit 16 Analytical Results Map
- 5-3.1h Solid Waste Management Unit 16 Analytical Results Map
- 5-3.2a Solid Waste Management Unit Group B (04, 05, 07, 10, 11, 17 & 53) Location Map**
- 5-3.2b Solid Waste Management Unit Group B (Bedrock Monitoring Wells) Analytical Results Map
- 5-3.2c Solid Waste Management Unit Group B (Lacustrine Monitoring Wells) Analytical Results Map
- 5-3.2d Solid Waste Management Unit Group B (Lacustrine Monitoring Wells) Analytical Results Map
- 5-3.3a Solid Waste Management Unit Group C (06, 09 & 19) Location Map**
- 5-3.3b Solid Waste Management Unit 06 Analytical Results Map
- 5-3.3c Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3d Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3e Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3f Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3g Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3h Solid Waste Management Unit 19 Analytical Results Map
- 5-3.4a Solid Waste Management Unit Group D (12, 13 & 14) Location Map**
- 5-3.4b Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4c Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4d Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4e Solid Waste Management Unit 13 Analytical Results Map

LIST OF FIGURES

(Continued)

Figure Number

- 5-3.4f Solid Waste Management Unit 13 Analytical Results Map
- 5-3.4g Solid Waste Management Unit 13 Analytical Results Map
- 5-3.4h Solid Waste Management Unit 14 Analytical Results Map
- 5-3.4i Solid Waste Management Unit 14 Analytical Results Map
- 5-3.5a Solid Waste Management Unit Group E (50, 51, & 52) Location Map**
- 5-3.5b Solid Waste Management Unit 50 Analytical Results Map
- 5-3.5c Solid Waste Management Unit 51 Analytical Results Map
- 5-3.5d Solid Waste Management Unit 52 Analytical Results Map
- 5-3.6a Solid Waste Management Unit Group F (31, 32, 33, 34, 35, 36, 37, 38, 39, & 40) Location Map**
- 5-3.6b Solid Waste Management Units 31 & 32 Analytical Results Map
- 5-3.6c Solid Waste Management Units 33 & 34 Analytical Results Map
- 5-3.6d Solid Waste Management Units 35 & 36 Analytical Results Map
- 5-3.6e Solid Waste Management Units 37 & 38 Analytical Results Map
- 5-3.6f Solid Waste Management Units 39 & 40 Analytical Results Map
- 5-3.7a Solid Waste Management Unit Group G (23, 27, 29 & 30) Location Map**
- 5-3.7b Solid Waste Management Unit 23 Analytical Results Map
- 5-3.7c Solid Waste Management Unit 27 Analytical Results Map
- 5-3.7d Solid Waste Management Unit 29 Analytical Results Map
- 5-3.7e Solid Waste Management Unit 30 Analytical Results Map
- 5-3.8a Solid Waste Management Unit Group H (46, 47, 48, & 49) Location Map**
- 5-3.8b Solid Waste Management Unit 46 Analytical Results Map
- 5-3.8c Solid Waste Management Unit 47 Analytical Results Map
- 5-3.8d Solid Waste Management Unit 48 Analytical Results Map
- 5-3.8e Solid Waste Management Unit 49 Analytical Results Map
- 5-3.9a Solid Waste Management Unit Group I (15, 20, 41, 42, 43, 44, & 45) Location Map**
- 5-3.9b Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9c Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9d Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9e Solid Waste Management Unit 20 Analytical Results Map
- 5-3.9f Solid Waste Management Unit 41 Analytical Results Map
- 5-3.9g Solid Waste Management Unit 42 Analytical Results Map
- 5-3.9h Solid Waste Management Unit 43 Analytical Results Map
- 5-3.9i Solid Waste Management Unit 44 Analytical Results Map
- 5-3.9j Solid Waste Management Unit 45 Analytical Results Map
- 5-4.1a Area of Concern A Analytical Results Map**
- 5-4.1b Area of Concern A Analytical Results Map
- 5-4.1c Area of Concern A Analytical Results Map
- 5-4.1d Area of Concern A Analytical Results Map
- 5-4.2 Area of Concern B Analytical Results Map
- 5-4.3 Area of Concern C Pug Mill Analytical Results Map

LIST OF FIGURES

(Continued)

Figure Number

- 5-4.4 [Reserved]
- 5-4.5 [Reserved]
- 5-4.6a Area of Concern F Location 1 Analytical Results Map
- 5-4.6b Area of Concern F Location 2 Analytical Results Map
- 5.4.7 [Reserved]
- 5-4.8a Area of Concern H Analytical Results Map
- 5-4.8b Area of Concern H Analytical Results Map
- 5-4.8c Area of Concern H Analytical Results Map
- 5-4.8d Area of Concern H Little Raccoon Creek Analytical Results Map
- 5-4.9 Area of Concern I Analytical Results Map

LIST OF APPENDICES

Appendix

VOLUME 3

- A Field Quality Control Forms
- B Borehole Log Forms
- C Daily Field Report Forms
- D Summary of Background Exceedances
- E Summary of Exceedances of Applicable Standards
- F Historical Groundwater Data and Validation Report

VOLUME 4

- G Closure Report Data

VOLUME 5

- H Summary of Analytical Data

VOLUMES 6 & 7

- I Analytical Data Validation Reports

EXECUTIVE SUMMARY

Introduction and Site History

A Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted at the Waste Management of Ohio, Inc facility in Vickery, Ohio (WM-Vickery) to determine if releases have occurred from Solid Waste Management Units (SWMUs) and potential Areas of Concern (AOCs) at the site. Previous investigations at the facility identified 53 SWMUs and 10 AOCs to be addressed by the RFI. Phase I RFI results were used to identify areas that may require additional characterization during a second phase of work (Phase II). Additional work and a Quantitative Risk Assessment (QRA) will determine if corrective action at this site is needed.

The facility is located in a rural area of Sandusky County, in north-central Ohio. The topography of the site is relatively level, with elevations generally ranging from 600 to 616 feet above mean sea level (MSL) with a slight dip to the north. The active facility comprises about 98 acres and is bounded by highways on the south, east, and north, and by vacant land to the west. The unincorporated community of Vickery lies 2 miles northeast of the site, and the cities of Clyde and Fremont are located approximately 4 miles south and 6 miles west, respectively.

The facility is permitted under RCRA to accept and dispose of liquid waste via underground injection. Originally an oil recovery service, the facility later accepted various industrial wastes and stored them in surface impoundments. In 1964, the facility was permitted to accept chemical process wastes. More impoundments were constructed as the inventory of wastes increased. Landfarming and oil recovery operations were also used to treat and dispose of waste materials. In 1972, a test hole was drilled to evaluate underground injection as a disposal option.

Eventually, seven injection wells were permitted and drilled onsite, and this method of disposal gradually supplanted the use of impoundments and landfarming. Three of these wells have been abandoned and plugged. Four injection wells are currently active, disposing of a variety of liquid wastes such as pickle liquors, acid and caustic wastes, and other aqueous wastes including landfill leachate. Materials that are not allowed by the facility's permit or wastes that cannot be managed properly are not accepted. By 1992, the 12 former impoundments were closed. Wastes generated by closure of the impoundments were either stabilized and fixed in place or relocated to a secure landfill known as the Toxic Substances Control Act (TSCA) closure cell. Several of the surface impoundments were certified clean-closed by the Ohio Environmental Protection Agency (OEPA).

Geology and Groundwater

The site is underlain by silty and clayey soils developed from lacustrine and glacial deposits. Beneath the surficial soils, lacustrine clays and silts are present to depths of 10 to 20 feet. These materials are underlain by a glacial till about 30 feet thick, which overlies dolomitic bedrock. The lacustrine material contains some fine sand and silt layers in the lower 5 feet, but the remainder is mostly clay and silt. The lower portion of the till contains sands and gravels, which are not continuous across the site. The remainder of the till consists of silty clay with some sand and traces of gravel. The hydraulic conductivity of these two units is very low, ranging from 10^{-7} to 10^{-9} cm/sec; they comprise the most common aquitards found in the northern portion of the United States. Although small-scale fractures have been

recognized in the upper portions of the lacustrine clay and till at the site, none of these fractures appeared to be open.

Groundwater flow in the lacustrine soils is toward the northwest, generally in the direction of topographic slope. A downward vertical gradient exists at the site, so that groundwater flows from the lacustrine deposits into the glacial till and the dolomite bedrock aquifer. However, the amount of downward flow through the overburden at the site is likely to be inconsequential, due to its low permeability. Estimates of flow times from lacustrine soils to the bedrock range from 100 to over 1,000 years.

Groundwater in the dolomite bedrock at the site flows to the north and northwest, towards Lake Erie. The bedrock exhibits a response to pumping that suggests it is a confined aquifer with fracture flow. The hydraulic conductivity of the dolomite aquifer is about 10^{-3} cm/sec. The bedrock aquifer is recharged primarily from an area about 3 miles southeast of the facility where it rises near the ground surface.

Site Investigation

The Phase I RFI involved collection of soil and sediment samples from SWMUs and AOCs that were grouped based on location, history, or other similarities. Groundwater samples were also collected from selected site monitoring wells. All work was guided by a RFI Work Plan that was approved by USEPA Region 5. The Work Plan included a Field Sampling Plan and Quality Assurance Project Plan that were based upon USEPA guidance and also approved by Region 5.

Most of the soil and sediment samples were analyzed for 40 CFR 264 Appendix IX parameters (volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organochlorine and organophosphate pesticides, PCBs, herbicides, metals, cyanide, sulfide, chloride, and dioxins/furans). About 10 percent of soil samples were also analyzed for geotechnical and geochemical properties. The geotechnical and geochemical data will be used during development of the QRA, and possibly during a future Corrective Measures Study (CMS).

Subsurface soil samples were collected using two unique procedures known as "select" and "grid node" sampling, depending on the sample type:

- The purpose of the "select location" samples was twofold, depending on the SWMU being sampled. Select location samples were collected from stabilized waste within the former impoundments to characterize the nature of these materials. Select location sampling at other SWMUs was conducted to evaluate whether there was a release from a potential source of contamination (e.g., an underground storage tank).
- "Grid node" samples were collected from natural soils from a uniform depth (2 to 4 feet) below former surface impoundments to detect evidence of impact.

Select location samples were collected by continuously sampling from three feet below the ground surface until the apparent base of each former impoundment was reached. The sample with the highest VOC content was selected by screening the headspace of a 4-oz glass jar containing a small amount of the sample, which had been warmed in a microwave oven. If contamination appeared to be present in native

soil beneath the SWMU, two additional samples were collected; immediately beneath the impoundment, and one from a greater depth to characterize the vertical extent of contamination.

For grid node samples, the base of each former impoundment was determined by visual appearance, interface changes, depth encountered and historical data. These soil samples were collected using split-spoon samplers, and sub-samples for laboratory analysis of VOCs were collected from the soil cores using EnCore™ samplers.

Soil samples were also collected from the surface in certain locations to determine if contamination was present due to spills or surface releases.

Sediment samples were collected from drainageways in depositional areas, at the water surface and/or at the center of the stream, to characterize possible impacts from spills.

All samples were labeled and stored under chain-of-custody control in iced coolers prior to shipment to the laboratory. Boreholes were abandoned by filling with bentonite pellets hydrated with potable water. If contamination appeared to be present below the bottom of the former impoundment, an additional soil sample was collected at a greater depth to characterize the vertical extent of contamination.

Potable water for decontamination was obtained from the City of Clyde (Ohio) Municipal Water Supply Station, located south of the site on South Route 510. This water source was analyzed for Appendix IX parameters prior to field activity, and was found to be adequate. Potable water was also used for borehole abandonment.

Investigation-derived wastes, including soil cuttings, disposable sampling equipment, and disposable personnel protective equipment, were disposed in 20-cubic yard roll-off containers provided by the facility. An approved waste disposal subcontractor removed this material and transported it to an appropriate disposal facility. Decontamination fluids were collected and treated by the onsite Integrated Aqueous Waste Treatment System prior to disposal in the facility's deep well injection system.

Investigation Findings

To determine if the potential for contamination existed, the Phase I RFI sampling results were compared to recognized human health- or ecology-based standards. These standards included U.S. EPA Region 5 data quality levels (DQLs), USEPA Region 9 Preliminary Remediation Goals (PRGs), background concentrations of metals in soil and groundwater samples, ecological toxicity (Ecotox) thresholds, and ecological DQLs.

Background soil samples were collected in an area that had not been used for waste management purposes, at the ground surface and a depth of 8 to 10 feet at five locations. These samples showed that metals are present in significant concentrations in natural soils at the site, including arsenic, barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc. The background concentrations of arsenic frequently exceeded the corresponding Region 9 PRG that was used to evaluate the RFI data. Background concentrations of chromium also sometimes exceeded the chromium PRG.

Metals results for the soil samples collected during the RFI were compared to background concentrations. If the results were below average background concentrations, the sample was deemed to reflect background conditions. For samples above the average background concentration, the sample was deemed to reflect background conditions if it was within the range of observed background values and appeared to correspond to the results from neighboring samples.

Samples in which metals concentrations were considered to be above average background were then examined in two ways. First, the concentrations were compared to the EPA Region 9 PRGs to evaluate the magnitude of the exceedance. Second, the boring log for that sample was inspected to determine if the nature of the sampled material correlated with the exceedance. For those metals for which the background concentration exceeded the PRG, the qualitative evaluation described above was still used as the screening standard to determine which samples might require further consideration.

The results of soil sampling activities within each SWMU group indicated the following general conclusions:

- The select location (SL), grid node (GN), and surface soil samples indicate that there have been no significant releases from the SWMUs and AOCs at the site.
- Most of the Phase I RFI soil samples contain arsenic concentrations above the PRG; however, these concentrations are within the range of and correlate well with arsenic concentrations in the background samples. The conclusion is that the arsenic is naturally present in site soils and is not indicative of impact from the site.
- Current groundwater sampling data, and a qualitative review of historical groundwater monitoring data, indicate there has been no detectable impact on groundwater quality in the surficial sediments or bedrock downgradient of the site. However, one of the shallow monitoring points (L-26) contained concentrations of several VOCs. The presence of these VOCs may be due to facility activities in the area.
- The sediment sampling results indicate that there has been no demonstrable impact from the facility on sediment quality in Little Raccoon Creek or Meyers Ditch.

Summary of Individual SWMUs and AOCs

SWMU Group A

SWMU Group A consists of four closed surface impoundments that held wastes during their operation. These wastes are now fixed in place and covered with clean clay fill. Select location (SL) samples collected from the fixed waste materials indicate the presence of several waste-related components above the PRGs, such as benzo(a)pyrene, dieldrin, 1,1,1-trichloroethane, chlorobenzene, chloroform, tetrachloroethene, toluene, trichloroethene, and methylene chloride. The presence of such constituents is expected within the SL samples, which were collected directly from stabilized waste materials. Grid node (GN) samples and vertical-delineation samples show that there are no soil impacts below or outside of the SWMU boundaries, except in two locations. One appears to be due to cross-contamination of the borehole, and the other appears to be an isolated occurrence bounded by uncontaminated soil.

SWMU Group B

This SWMU Group consists of six former impoundments and the TSCA Closure Cell, which were assessed via groundwater sampling. The impoundments were certified clean-closed by OEPA. Historical groundwater data from this area were also reviewed to qualify and enable its use in subsequent phases of work.

A groundwater sample from the capillary drain beneath the closure cell exceeded only the cyanide DQL, and does not appear to be related to the waste materials that were placed in the closure cell. The groundwater data also indicate that there has been no significant impact from these units in the sampled downgradient wells. A sample from a background monitoring point (L-19A) also exceeded the cyanide DQL.

The results for the bedrock wells confirm the validity of historical groundwater monitoring data collected at the facility over the past 13 years. One downgradient well (MW-14R) had one detection that exceeded the DQL for bis(2-ethylhexyl)phthalate. This constituent was also detected below the DQL in the upgradient well. These results confirm that there has been no release from this SWMU.

A lacustrine well upgradient of the closure cell (L-26) contained several VOCs (1,1-dichloroethane, 1,2-dichloroethane, and 1,4-dioxane), arsenic, lead, and selenium above their respective DQLs. As noted above, these exceedences may be due to facility activities in the area.

SWMU Group C

SWMU Group C consists of two former surface impoundments and a former drum storage area. Select location (SL) soil samples collected from the fixed wastes indicate the presence of waste-related parameters above the PRGs, such as benzene, chromium, and lead. As noted above, the presence of such constituents is expected within the SL samples, which were collected directly from stabilized waste materials. Additional sampling results show that evidence of contamination did not extend beneath the base of the former surface impoundments. The grid node sampling results also confirm this conclusion. The absence of these constituents in the GN samples for this SWMU group indicates they have not migrated from the stabilized waste. No PRGs were exceeded in samples from the former drum storage area.

SWMU Group D

This SWMU Group consists of three former landfarm areas that were closed, backfilled with clean soils, and capped with clay. None of the soil samples collected from this SWMU Group exceeded applicable standards (the PRGs), except for benzo(a)pyrene (one sample) and arsenic. Most of the RFI soil samples contained arsenic above the PRG, but these results are interpreted to represent natural conditions and not due to impact from the facility.

SWMU Group E

SWMU Group E consists of several former injection wells. Surficial soil samples collected around the locations of these SWMUs indicate some of the metals concentrations exceeded background but did not exceed their corresponding PRGs. The concentrations of all other constituents were also below PRGs. These results are interpreted as representing natural conditions and are not indicative of facility impact.

SWMU Group F

SWMU Group F consists of several filtered acid tanks and associated pump houses. None of the surface soil samples collected in this SWMU Group exceeded applicable standards, except arsenic and chromium. The arsenic PRG was exceeded in all of the samples, and the chromium PRG was exceeded in one sample. These conditions are interpreted as the result of natural conditions and not indicative of facility impact.

SWMU Group G

SWMU Group G includes the truck unloading area, various tanks, filter presses, and pump houses. Several of these units were not sampled because there was no evidence or records of a release or potential release. Soil samples collected at the other locations did not exceed applicable standards, except for arsenic. The arsenic results are interpreted as representing natural conditions. The average background concentrations of some target metals were exceeded in several samples, but they did not exceed any corresponding PRGs. The results indicate that there have been no releases requiring further consideration.

SWMU Group H

SWMU Group H includes the active injection wells at the site. Surface soil samples collected around each injection well did not exceed applicable standards, except for arsenic. The arsenic PRG was exceeded in most of the samples, but only one sample exceeded the average background concentration. These results are interpreted as the result of natural conditions and not indicative of facility impact. The concentrations of some target metals exceeded the average background in several samples, but did not exceed their corresponding PRGs.

SWMU Group I

SWMU Group I consists of various tanks, an oil recovery area, and the facility's sanitary wastewater treatment facility. No sampling was conducted at the former W-Tanks or the Sluice Pit, which were clean-closed. Sampling at the other locations showed that only one sample in the oil recovery area exceeded a PRG (for chromium). This indicates that the remediation conducted in this area was sufficient, as no PCB or SVOC exceedences were noted. At the lab waste tank, there was no apparent indication of a contaminant release. No potential waste constituents were observed above applicable standards at the PCB storage area, except for arsenic and benzo(a)pyrene. These conditions do not indicate significant impact at this concentration. No impacts from the sanitary wastewater treatment facility or the Truck Unloading Facility and Maintenance Building Sewage Holding Tanks were noted.

AOC A – Emergency Drain Tanks

Soil sampling to characterize surface soil around these tanks indicated that the concentrations of target parameters did not exceed the corresponding PRGs, except for arsenic and three SVOCs in one sample. The SVOCs were not potential waste constituents for this AOC, and do not appear to be related to possible releases from the emergency drain tanks. The arsenic results are interpreted as naturally occurring.

AOC B - North Parking Lot - Truck Unloading Facility

Surface soil samples show no exceedances of applicable standards, except for chromium and a few SVOCs in one sample. There does not appear to be any impact related to possible releases from this AOC. The chromium exceedance was not confirmed in the duplicate sample, and the SVOCs may be related to asphalt or paving materials that were included with the sample; they are not interpreted as relating to potential facility impact.

AOC C - Pug Mill Staging Area (Hay Mill)

Soil samples collected to characterize the area where the Pug Mill was stored after it was decontaminated do not contain any of the potential contaminants, except for arsenic, above PRGs. The arsenic detection is interpreted as representing naturally occurring conditions.

AOC D - Borrow Pit #1

This AOC consists of Borrow Pit #1, which was the origin of soils used to increase the height of the dikes for Surface Impoundments 11 and 12. The area was clean-closed; no sampling was conducted.

AOC E - Borrow Pit #2

Borrow Pit #2 provided clay and fill material for the closure of Surface Impoundments 4, 5, and 7, and several other areas. The pit filled with water and is now a freshwater lake and wildlife habitat; therefore, no sampling was conducted.

AOC F - Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale

This AOC consists of the active truck sampling area, the active scale and receiving trailer, the inactive (old) truck scale, and an underground storage tank, housed within a concrete vault, that is used to collect rain and snowmelt from the covered truck sampling area. None of these samples exceeded applicable standards, except for arsenic. Some of the target metal concentrations exceeded average background values, but only arsenic exceeded the corresponding PRG; this is interpreted as representing naturally-occurring conditions.

AOC G - Roll-Off Staging Pad

This AOC consists of the area used to stage roll-off boxes containing filter cake from the filter press building. No releases are documented to have occurred around this pad, which was constructed in 1991. In accordance with the Work Plan, no sampling was conducted at this AOC.

AOC H - Facility Aboveground Transfer Piping

Soil samples were collected to assess historic spills that have occurred along above-ground piping at the facility. None of the surface soil sample samples exceeded PRGs at this location, except for arsenic. This is interpreted as representing naturally occurring conditions.

Sediment samples collected in nearby drainages contained none of the potential non-metal contaminants above PRGs, except for cresol (methylphenol) in two locations, cyanide in two locations, and DDT in one location. Some of the target metal concentrations exceeded average background, but only arsenic, mercury (one location), nickel, and zinc (one location) exceeded the corresponding standard. These results do not demonstrate a trend and cannot be directly attributed to facility impact.

AOC I - Remaining Underground Piping

Geophysical methods used to determine the presence of abandoned underground piping were inconclusive; therefore, test pits were excavated to directly observe evidence of underground piping. No piping was found in four test pits. Evidence of former underground piping and/or potential contamination was observed in three test pits. Underground piping was also exposed in a trench beneath an aboveground pipeline. However, samples collected from these test pits showed no exceedences of applicable standards, except for arsenic. Several of the target metal concentrations were exceeded in these samples, but none were above the corresponding PRGs. As explained above, these results are interpreted as representative of natural conditions and do not indicate impact from the former piping.

AOC J - Area Around Monitoring Well L-19

Monitoring results from well L-19 indicate that the historical presence of 1,2-dichloroethane has not migrated from this location. No sampling was conducted at this AOC. Recent monitoring data demonstrate that there is no detectable impact on bedrock groundwater quality from the features monitored by the bedrock wells. Nickel, and lesser occurrences of chromium and lead, are present in some of the lacustrine and till wells. However, there is no trend or pattern that could be clearly attributable to impact from the facility. In fact, the concentrations of some of these parameters were higher in upgradient wells.

GLOSSARY

AOC	Area of Concern
Appendix IX	Appendix IX analytical parameters, as listed in Appendix IX of the Federal regulations governing characterization of hazardous waste (40 CFR 261)
ASTM	American Society for Testing and Materials (Philadelphia, PA)
bgs	below ground surface
CEC	Cation Exchange Capacity
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
cm/sec	centimeters per second
COC	Chain of Custody
DQL	Data Quality Level
DQO	Data Quality Objective
DRO	Diesel-range Organics
EM	Electromagnetic
EDQL	Ecological Data Quality Level
FAT	Filtered Acid Tank
FD	Field Duplicate
FSP	Field Sampling Plan
GN	Grid Node (sample)
GPR	Ground Penetrating Radar
GT	Geotechnical
GWSA	Groundwater Sampling and Analysis
HASP	Health and Safety Plan
HSA	Hollow-stem Auger
HSWA	RCRA Hazardous and Solid Waste Amendments
IDW	Investigation-derived Waste
lbs.	Pounds
LD	Laboratory Duplicate
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
ml	milliliter
MS	Matrix Spike
MSD	Matrix Spike Duplicate

MSL	Mean Sea Level
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OLD	Ohio Liquid Disposal
oz.	ounce
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
Phase I	Phase I of a RCRA Facility Investigation
Phase II	Phase II of a RCRA Facility Investigation
PIC	Public Information Committee
PIP	Public Involvement Plan
PID	Photoionization Detector
PPE	Personal Protective Equipment
PRG	Preliminary Remedial Goal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QRA	Quantitative Risk Assessment
RCC	Report on Current Conditions
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SL	Select Location (sample)
SOP	Standard Operating Procedure
SVOC	Semi-volatile Organic Compound
SW-846	<i>Test Methods for Evaluating Solid Waste (SW-846)</i> , Third Edition, Final Update 3, U.S. EPA, Washington, DC, June 1997
SWMU	Solid Waste Management Unit
TOC	Total Organic Carbon
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
UIC	Underground Injection Control
USEPA	United States Environmental Protection Agency
VSI	Visual Site Inspection
VOC	Volatile Organic Compound
WMI	Waste Management, Inc.
WM-Vickery	Waste Management of Ohio, Inc., Vickery, Ohio
WP	Work Plan

RCRA Facility Investigation Phase I Report

Waste Management of Ohio, Inc.
Vickery, Ohio

1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Phase I Report was prepared by Earth Tech, Inc. for Waste Management of Ohio, Inc., Vickery, Ohio (WM-Vickery). This Phase I RFI was completed under the direction of the United States Environmental Protection Agency (USEPA), Region 5, as a condition of the RCRA Hazardous and Solid Waste Amendments (HSWA) Permit issued to WM-Vickery on October 24, 1994.

The need for the facility to define and implement Corrective Action Requirements is documented in the HSWA Permit, in accordance with Section 3004 (u) of RCRA. These requirements must be instituted as necessary by WM-Vickery to protect human health and the environment from all releases of hazardous waste(s) or hazardous constituent(s) from any solid waste management unit (SWMU) at the facility, regardless of the time at which the waste was placed in such units. Corrective Action Requirements, whether onsite or offsite, will be defined through the RFI and a Corrective Measures Study (CMS), followed by Corrective Measures Implementation (CMI), as necessary.

The purpose of an RFI is to thoroughly evaluate the nature and extent of the releases, if any, of hazardous waste(s) or hazardous constituent(s) at the site. This report presents the objectives, activities, and analytical and field methodologies completed during the Phase I RFI field work conducted from March 9, 1999 through May 12, 1999, and discusses the results of this work.

1.1 Project Objectives

The Phase I RFI at the WM-Vickery TSD Facility was conducted to determine if releases have occurred from Solid Waste Management Units (SWMUs) and potential Areas of Concern (AOCs) at the site. The results of this Phase I RFI will be used to determine areas that may require additional characterization during a second phase of work (Phase II). There should be no need for a Phase III RFI. Prior to the Phase II investigation, specific project objectives and Data Quality Levels (DQLs) will be established for each location where contamination was identified during Phase I. The information from both Phase I and Phase II will be used to perform a Quantitative Risk Assessment (QRA) to determine if corrective action at this site is needed, and to support the selection and design of potential remedial alternatives.

1.2 Site Background

1.2.1 Site Location and Setting

The WM-Vickery Treatment, Storage, and Disposal (TSD) Facility is located in a rural, unincorporated area of Sandusky County in the north-central part of Ohio. The facility's active area encompasses approximately 98 acres and is located adjacent to State Route 412 near the intersection of State Routes 510 and 412 (Figure 1-1). The facility is bounded by Highways 412 and 510 on the south and east, and by the Ohio Turnpike on the north. A portion of the property extends to County Road 244 on the west. The geographic coordinates of the facility are north latitude 41° 22' 19" and west longitude 82° 22' 40". The unincorporated community of Vickery lies 2 miles northeast of the site, and the cities of Clyde and Fremont are located approximately 4 miles to the south and 6 miles to the west, respectively.

WM-Vickery operates as a treatment, storage, and disposal facility for liquid hazardous waste. The USEPA Identification Number for the site is OHD 020 273 819. Operations began in 1958 as Don's Oil Service, and in 1970 the facility changed its name to Ohio Liquid Disposal (OLD). Waste Management, Inc. (WMI) acquired the facility in 1978 and later transferred it to Chemical Waste Management (a wholly owned subsidiary of WMI). In December 1997, the name of the facility changed from Chemical Waste Management-Vickery to Waste Management of Ohio, Inc. Rust Environment & Infrastructure, Inc., which began the RFI work at this site, assumed the name of Earth Tech, Inc. in 1998.

1.2.2 Site History

The facility began operation as an oil recovery service, hauling waste oil from neighboring industries to a central facility and recovering the oil for eventual resale. Later, the facility began accepting various industrial wastes and storing them in surface impoundments. In 1964, the facility was granted permission by the State of Ohio to accept chemical process waste, and more surface impoundments were constructed. As the inventory of wastes increased, the operators began searching for a suitable means to dispose of them. In 1972, OLD was granted permission to drill a test hole to evaluate the subsurface conditions for the possible location of an injection well. After a number of years of applying for approval to use the injection well, being denied, and appealing, approval was granted to OLD to inject waste into subsurface wells drilled on the site.

A total of 7 injection wells were drilled onsite throughout the history of the facility (Injection Wells 1, 1A, 2, 3, 4, 5 and 6). Injection Wells 1, 1A, and 3 were plugged and abandoned. Presently, Injection Wells 2, 4, 5, and 6 are active. These injection wells are regulated under four Underground Injection Control (UIC) permits issued by the Ohio Environmental Protection Agency (OEPA) and maintained at the facility. More information regarding the injection wells can be found in the Report on Current Conditions (RCC) developed for the site (December 1994, Revised April 1995). Additional facilities used at the site to treat, store, and dispose of wastes included landfarming activities and an Oil Recovery Facility.

During the history of the facility, a total of 12 surface impoundments existed. The locations of these former surface impoundments are shown in Figure 1-2. The surface impoundments were constructed between 1964 and 1975. The surface impoundments were closed between 1979 and 1992; details of these closures can be found in Section 6.0 of the RCC.

To dispose of the wastes generated during the closure of the surface impoundments and by other treatment facilities, WM-Vickery was granted an approval to construct a Toxic Substances Control Act (TSCA) closure cell. The closure cell was built between 1986 and 1988. The facility was given approval to move waste from a temporary waste pile into the closure cell in 1990. The waste in the closure cell is comprised of stabilized wastes from the closure of several surface impoundments (Ponds #4, #5, #7, #11, and #12), and from specific facilities detailed in a 1984 Consent Decree. The surface impoundments noted above were certified clean-closed, and these closures were approved by OEPA and the USEPA. The current layout of the WM-Vickery facility is presented in Figure 1-3.

In the past, all site stormwater was managed by perimeter dikes constructed for this purpose. Runoff from the main site area drained to a stormwater retention basin south of the rail line to the site, where it was retained by a sluice gate. Retained stormwater was discharged to Meyers Ditch through this sluice gate once or twice a year after quality testing and approval by the OEPA. Water retained by the containment dikes north of the rail line around Injection Wells 5 and 6 was allowed to pond and evaporate. Stormwater formerly ponded on the site in many areas. Drainage outside the perimeter-diked area flowed to Little Raccoon Creek via the roadside ditches along State Route 510, or into Meyers Ditch. Surface runoff in the extreme northwest corner of the property entered Raccoon Creek via the roadside ditches created for the Ohio Turnpike.

1.2.3 Present Conditions

WM-Vickery currently receives a large variety of liquid wastes. The most common types include: pickle liquors, acid wastes, caustic wastes, neutral wastes, and other aqueous wastes including landfill leachate. The facility does not accept radioactive wastes, infectious wastes, explosive or shock sensitive wastes, air reactive wastes, compressed gases, reactive wastes that generate dangerous quantities of toxic or explosive gases when acidified, ignitable wastes, wastes containing more than 5% Volatile Organic Compounds (VOCs), or wastes that the facility deems cannot be managed properly.

Stormwater control methods were changed to the present configuration with the implementation of the Surface Water Management Plan in 1983. Site runoff is now controlled by a ditch and flow control gate system. Runoff is either contained or allowed to discharge from the site at selected locations. Drainage outside the perimeter dike system flows into Little Raccoon Creek via roadside ditches along State Route 510, or into Meyers Ditch near the west-central portion of the facility. Meyers Ditch leaves the site at the northern boundary under the Ohio Turnpike.

1.2.4 Previous Investigations and Reports

In 1990, Jacobs Engineering Group (Jacobs), was subcontracted by the USEPA through Metcalf & Eddy to perform a RCRA Facility Assessment (RFA) at the facility. As part of this RFA, Jacobs conducted a Visual Site Inspection (VSI) to verify and identify SWMUs and Areas of Concern(s) (AOC) that were identified during a preliminary review. Jacobs identified 45 SWMUs and 5 AOCs. The RFA Report provided a detailed description of each SWMU and AOC.

In accordance with the HSWA Permit granted to WM-Vickery, the RCC was submitted to update the USEPA on current conditions at the facility since the RFA was completed. As noted above, this report

was submitted to the USEPA in December 1994, and a revised version was prepared in April 1995. The RCC documented the current conditions at the facility and identified an additional 7 SWMUs and 4 AOCs, for a total of 52 SWMUs and 9 AOCs. The USEPA subsequently identified the TSCA closure cell as another SWMU, bringing the total number of SWMUs to 53. In response to OEPA concerns regarding the area around monitoring well L19, this area was added as an AOC, bringing the total number of AOCs to 10. The SWMUs and AOCs identified at the site are shown in Figures 1-4 and 1-5, respectively.

1.2.5 Future Activities

Following review and approval of the Phase I RFI by USEPA, additional work may be conducted to verify some of the Phase I findings or fill data gaps that are identified. This additional work will be conducted by the facility in a second phase of the RFI.

As with the current phase, this additional work would be described in a Phase II Work Plan prepared by the facility. The Phase II Work Plan would be reviewed and approved by USEPA prior to Phase II field work. Following completion of the additional work, the results of Phases I and II would then be evaluated during a Quantitative Risk Assessment (QRA). The purpose of the QRA would be to identify areas of the site, if any, that present an unacceptable risk to human health or the environment, and therefore may require corrective measures. The QRA methodology would be reviewed and approved by USEPA prior to conducting this work.

2.0 SITE DESCRIPTION

2.1 General Information

The facility and its topography have been altered throughout history with the construction of surface impoundments, closure cells, structures, and the closure of the surface impoundments. Additionally, non-facility structures such as an abandoned railroad grade and the Ohio Turnpike embankment have altered the natural topography of the area. The topography of the WM-Vickery facility is relatively level, with elevations generally ranging from 600 to 616 feet above mean sea level (MSL) with a slight dip to the north (see Figure 1-3).

2.2 Site Geology and Soils

2.2.1 Bedrock

Bedrock under the WM-Vickery facility is composed of dolomites of the Salina Group. The dolomite is found from 40 to 50 feet below ground surface (bgs) at elevations ranging from 552 to 576 feet above MSL. Boring information available from previous investigations indicates the bedrock surface to be somewhat variable, although for the most part it slopes gently downward towards the north. The bedrock surface appears to have a small valley running approximately north/south through the center of the site.

Detailed rock-core logs collected during previous investigations indicate the bedrock here is a mixture of shale, dolomite, gypsum, and anhydrite. The variation of bedrock type makes correlation of the bedrock across the site difficult. However, a black shale does appear to exist across most of the site. This black shale is interbedded with gypsum layers of varying thickness.

The dolomite that is present at the site is very shaley with various amounts of gypsum present. Within the upper 30 feet of this unit, the dolomite is extensively and variably fractured and jointed, and contains numerous partially filled anhydrite and gypsum-filled voids and solution cavities up to ½ inch in diameter. These discontinuities are persistent throughout the site. Cross-sectional views of the site geology are presented on Figure 2-1.

2.2.2 Glacial Deposits

The surface soils on the site consist of the Del Ray and Lenawee Series. Both soils were formed on lacustrine deposits. The Lenawee Series contains more clay than the Del Ray Series, but otherwise they are very similar. Both soils contain stratified silts and clays in their lower portions (Golder, 1983).

The overburden that exists onsite consists of two types of glacial deposits. At the surface is a silty clay and clayey silt lacustrine deposit, approximately 10 to 20 feet thick. The lacustrine material is underlain by a glacial till approximately 30 feet thick, which lies directly on top of bedrock. These two soil deposits, the lacustrine material and the glacial till, can be further subdivided.

The till unit consists of two separate tills: a thin (0 to 10 feet thick) lowermost unit consisting of material derived from the bedrock; and a thick, clay-rich upper unit. The lower till contains considerable amounts of sands and gravels, many of which are composed of soft weathered gypsum. This lowermost basal till

is not found continuously across the site. It represents an early glaciation and apparently was partially eroded by a subsequent glacial re-advance.

The upper till deposit consists of a silty clay with some sand and traces of gravel. The material was derived from lacustrine silts and clays that were deposited in a proglacial lake during a previous retreat of the glacial ice and reworked by a subsequent glacial re-advance. The upper surface of the silty clay till was probably undulating with a relief of 5 to 20 feet.

The upper few feet of the till material, although texturally identical to the lower portion, appear to be slightly different structurally in that there is a suggestion of lacustrine lamination. This agrees with geological literature (Goldthwait, 1961) that a water-modified till is present in several places in northern Ohio, sandwiched between a till and overlying lacustrine material. The water-modified till consists of till material that was deposited into or through water and, therefore, can contain some of the characteristics of a lacustrine deposit. Transport distances, however, would be very short, as shown by the lack of sorting.

The lacustrine material overlying the till material can also be subdivided into two groups. Generally, the lower 5 feet contains some fine sand and silt layers alternating with clay layers; however, even the fine sand and silt layers contain considerable amounts of clay. The thickness of the layers ranges from very thin up to one-half inch. A composite grain-size analysis of a sample from this unit indicates that it contains 3 percent sand, 55 percent silt, and 42 percent clay. Some of these layers are documented as being brown, rather than gray, indicating that oxidation occurred sometime during the post-depositional history of the unit.

This lower stratified portion of the lacustrine material is not found continuously across the facility. However, the lower portion of the lacustrine deposit is documented as appearing to be continuous across the active part of the facility where the surface impoundments were once located. It most probably represents a time period, shortly after deglaciation, when a proglacial lake was first formed in front of the ice. The varve-like lamina in this unit may be caused by seasonal fluctuations in sediment input from the nearby melting ice, or may represent periodic but not seasonal influxes of sediment.

The remaining upper lacustrine material consists of an average of 49 percent clay, 46 percent silt, and 5 percent sand, and some of the samples collected across the site contained gravel. The material is very homogeneous, with almost no indication of fine sand or silt layers, although most samples collected were laminated.

It has been observed that in some locations in the Great Plains of the U.S., deposits of clayey or silty till and glaciolacustrine clay have networks of hair-line fractures that are predominately vertical or near vertical. The distance between fractures varies from centimeters to several meters, and the fractures are commonly infilled with calcite or gypsum. The soil matrix adjacent to the fractures is commonly distinguished by a color change caused by several different degrees of oxidation or reduction (Freeze and Cherry, 1979). Fractures of this type have been recognized in the upper portions of both the glaciolacustrine clays and the upper till beneath the site. None of these fractures were reported open (Golder, 1990).

Many explanations as to the origin of these fractures have been proposed. In areas of glacial till and lacustrine clay, highly fractured zones are common within several meters of the ground surface. Shallow

fractures are caused primarily by stress changes resulting from cycles of wetting and drying, and freezing and thawing. Fractures of this nature can produce a secondary porosity within this material (Freeze and Cherry, 1979). The vertical fractures noted at the top of both the glaciolacustrine clay and the upper till beneath the site are suspected of being formed in this manner.

Other mechanisms that form fracture systems at depth may be related to glacial unloading, crustal rebound, and volume changes caused by geochemical processes, such as cation exchange (Freeze and Cherry, 1979). No fractures have been noted beneath the site in the middle to lower portions of the glaciolacustrine clay or in the lower till.

3.0 HYDROGEOLOGY

3.1 Previous Investigations

The site hydrogeology has been thoroughly studied by previous investigations performed at the site. The first significant hydrogeologic investigation at the WM-Vickery facility was conducted by Bowser-Morner (1983). This study produced information on the hydrogeology of the site and a statistical analysis of the groundwater quality data. Most of the site-specific studies that followed the Bowser-Morner investigation were conducted by Golder Associates. These studies reevaluated the hydrogeologic system based upon additional data and focused on specific issues concerning the hydrogeologic and monitoring systems. These studies are referenced in Section 1.2.4 and Section 8.0 of this report.

3.1.1 Groundwater Flow in the Bedrock

Groundwater flow in the dolomite bedrock under the facility has been interpreted from water-level data collected over several years using the groundwater monitoring system at the site (Figure 3-1). Regional groundwater flow, as interpreted from regional potentiometric data presented in Figure 3-2, is generally to the north and northwest, towards Lake Erie.

The bedrock aquifer is quick to respond to pumping stresses at the site. This is typical of confined aquifers with fracture flow. Bowser-Morner identified a local radial flow pattern which is produced by pumping from the onsite truck wash well. When pumping ceases, the aquifer quickly recovers to the natural gradient conditions, with groundwater flow to the north and northwest.

Since 1983, bedrock hydraulic conductivity data have been developed from site-specific aquifer pumping tests. Prior to hydrogeologic investigations at the site, the Ohio Department of Natural Resources (ODNR) conducted large-scale aquifer pumping tests within the bedrock, 3 miles to 10 miles south of the site (ODNR, 1970). Reported hydraulic conductivities ranged from 2.0×10^{-2} to 3.2×10^{-2} centimeters per second (cm/sec). For the site, reported hydraulic conductivities for the bedrock aquifer range from 5.5×10^{-3} to 2.0×10^{-4} cm/sec, as referenced in Bowser-Morner (1983), Golder (1983) and Dames and Moore (1983). The high variability in extent and amount of the discontinuities within the bedrock can easily explain the variation in reported hydraulic conductivities derived from pumping test data. Based upon packer tests, pumping tests, and in-situ well tests, Golder (1988) determined an average hydraulic conductivity of 6.0×10^{-3} cm/sec for the bedrock aquifer.

Data from the site, combined with estimates from similar geologic materials, suggest that the hydraulic conductivity of the dolomite aquifer underlying the site is approximately 6×10^{-3} cm/sec (125 gallons/day/ft²). The reported range of hydraulic conductivity is 3.2×10^{-2} to 2.0×10^{-4} cm/sec. Most of the recharge for the dolomite aquifer in this area occurs roughly 3 miles to the southeast of the facility, where the bedrock surface rises to within several feet of the ground surface.

3.1.2 Groundwater Flow in the Surficial Deposits

Water-level elevation data from shallow monitoring wells at the site (see Figure 3-1) indicate a trend of decreasing potential to the northwest, which is generally the direction of ground surface slope. These wells are completed within the overburden materials.

The potentiometric surface in the lacustrine soils is higher in elevation than the potentiometric surface of the glacial till, which in turn is higher in elevation than the potentiometric surface of the dolomite aquifer. The decreasing hydraulic head with depth causes a downward vertical gradient toward the dolomite. However, the amount of flow through the overburden at the site is likely to be inconsequential, due to its low permeability, in relation to the amount of infiltration to the bedrock aquifer from its offsite recharge area.

Hydraulic Conductivity

The vertical hydraulic conductivity of the upper lacustrine material is on the order of 10^{-8} to 10^{-9} centimeters per second (cm/sec). The horizontal hydraulic conductivity of this unit is expected to be similar because of its high clay content and the absence of well-sorted sand lamina. The upper lacustrine deposits were laid down in relatively quiet water some distance from the glacial ice front. The small amounts of gravel present may have been rafted in on melting ice sheets.

Norris and Fiddler (1971) provide a range for hydraulic conductivities of glacial till in north-central Ohio of 1.0×10^{-7} to 3.5×10^{-8} centimeters per second (cm/sec). Based upon this information, Golder (1988) classified both the glaciolacustrine clay and the glacial till as aquitards. This classification was confirmed by in-situ well tests at the site and laboratory measurements on overburden samples. These tests have produced several estimates of hydraulic conductivity for the overburden materials (shown below). These values all confirm that the lacustrine deposits and glacial till at the site have low to very low permeabilities.

Reference	Lacustrine Deposits			Glacial Till			Notes
	Low	Average	High	Low	Average	High	
Norris and Fidler (1971)	-	-	-	3.5×10^{-8}	-	1×10^{-7}	north-central Ohio
Bowser Morner (1983)	-	-	-	6.0×10^{-9}	-	7.0×10^{-7}	
Golder (1983, 1988)	-	-	-	1.0×10^{-9}	-	8.3×10^{-5}	in-situ and lab tests
	-	-	-	8.4×10^{-9}	-	2.6×10^{-8}	lab tests
	-	-	-	2.0×10^{-8}	-	7.0×10^{-7}	in-situ tests
Golder (1990)	2.3×10^{-7}	1.0×10^{-6}	8.2×10^{-5}	5.2×10^{-8}	2.0×10^{-7}	7.0×10^{-7}	

The in-situ well tests produced values approximately one order of magnitude higher than the laboratory tests, but still low enough to be considered an aquitard.

Overburden Fractures

In many glacial till deposits of the northern U.S., small fractures (discussed in the previous section) can enhance groundwater flow capacity. The hydraulic conductivity of fractured till and clay, as determined by field tests, is commonly one to three orders of magnitude higher than values determined by laboratory tests of smaller, non-fractured samples (Freeze and Cherry, 1979).

The effects of such fractures on the hydraulic conductivity of the lacustrine clay were evaluated by Golder (1985). In their study, the hydraulic conductivity of the clay from laboratory tests ranged from 8.6×10^{-8} to 6.1×10^{-9} cm/sec, while in-situ well tests determined the value to be 1.0×10^{-6} cm/sec. Because of suspected open fractures within the upper portions of the clay, the study concluded that the in-situ tests produced a more representative approximation of hydraulic conductivity. The study estimated the fracture porosity as 0.1 percent (0.001), and hypothesized that the test wells may have penetrated or were affected by these fractures, while the laboratory soil samples may not have included any fractures. The in-situ tests produced values of two to three orders of magnitude greater than the laboratory tests. Therefore, the hydraulic conductivity of the glacial sediments may be more accurately calculated using data generated by in-situ well tests.

Overburden Flow Rates

Average vertical flow times from lacustrine soils to the bedrock were estimated to be about 100 years (Golder, 1988). This estimate was based on a composite travel time calculated using flow rates of 0.025 foot/day in 15 feet of glaciolacustrine clay and 0.001 foot/day through 35 feet of glacial till, producing an estimate of 97.5 years.

Based on a nominal thickness of 50 feet for the overburden materials (lacustrine clay and glacial till) and a hydraulic head difference of 10 feet between the overburden and the bedrock (Golder 1990), a vertical gradient of approximately 0.2 was calculated. Using this estimate, a vertical flow velocity of 0.04 foot/year was estimated, based on an effective porosity of 10 percent (0.1) and an estimated vertical hydraulic conductivity of 2.0×10^{-8} cm/sec. With the same overburden thickness as above, the travel time from the surface to the bedrock aquifer would be approximately 1,250 years.

Using a hydraulic gradient of 0.5 (the maximum observed in these aquitards) and the average regional hydraulic conductivity (10^{-9} cm/sec), nearly 10,000 years would be required for water to flow through a 10 meter (33 feet) thick non-fractured layer of this material (Freeze and Cherry, 1979).

4.0 INVESTIGATIVE PROCEDURES

As mentioned in Section 1, this Phase I RFI was conducted to determine if releases have occurred from SWMUs and potential AOCs at the facility. This section of the report describes the analytical and field methodologies completed during the fieldwork at the site, conducted from March 9, 1999 through May 12, 1999.

4.1 Identification of SWMUs and AOCs

The Phase I RFI field investigation was conducted by collecting soil and sediment samples in specific SWMU groups and AOCs. The locations of these SWMU groups and AOCs are presented on Figures 1-4, 1-5, and 4-1. The SWMUs were grouped together based on location at the site, logistics, operational unit similarities and direct interaction with other units within the SWMU group. The SWMU Groups and AOCs are described in Table 4-1. Groundwater sampling was also conducted to evaluate potential impact from SWMU Group B.

4.2 Field Sampling Plan

Section 5.0 of the approved Phase I RFI Work Plan (WP) presented the Field Sampling Plan (FSP) for the Phase I RFI. The FSP was used to guide all data-gathering tasks associated with the Phase I RFI.

The field-screening and sampling efforts described in the FSP, and the analytical parameters selected to evaluate the samples, were directed toward the specific materials that were handled within each of the SWMU groups or AOCs. Specific criteria for sample selection and frequency were included in the FSP for each group. Sample collection activities for the SWMUs and AOCs, which were presented in Table 1-1 of the Quality Assurance Project Plan (QAPP), are summarized in Section 4.3.

4.2.1 Data Quality Objectives

Data Quality Objectives (DQOs) for this Phase I RFI were based on the concept that different data uses require different data quality. Two levels of analytical data quality were used in this Phase I RFI; field-screening (Level 1) and confirmation (Level 3). As described in Section 1.4.3 of the QAPP, these DQOs were applied as follows:

Field Screening Level

This level of data quality was used for monitoring (screening) of volatile organic compounds (VOCs) and other field measurements (e.g., specific conductivity and pH measurements). The VOC screening data were used for the following purposes:

- i) general characterization of possible contaminant levels through casual screening of soil cores;
- ii) selection of samples for laboratory analysis through a specified headspace screening of soil samples; and

- iii) monitoring of ambient and work-space atmospheres for worker health and safety.

Field screening was performed onsite using calibrated photoionization detectors (PIDs). A Photovac MicroTip MP-1000 was the primary PID used for field data collection. A HNU Model ISPI-101 PID was used for headspace screening. Health and safety monitoring was conducted with a MultiRAE Quad-Gas PID. Field instruments were calibrated daily prior to use and recalibrated every 25 samples. Calibration results were documented in accordance with procedures specified by the manufacturer and Section 6 of the QAPP. Calibration documentation is presented in Appendix A.

Confirmation Level

The confirmation level of analytical data quality provides the highest level of data quality. Its uses include, but are not limited to, risk assessment, remedial alternatives evaluation, and cleanup level selection. These analyses require full documentation of SW-846 analytical methods, sample preparation steps, data packages, and data validation procedures necessary to provide defensible data. Quality control must be sufficient to define the precision and accuracy of these procedures at every step. In general, confirmation-level data will be used as the basis for reducing the parameter lists for subsequent phases of the RFI. These data also will be used in a QRA. During the Phase I RFI, confirmation-level data were generated in the following instances:

- At two of the SWMU groups (Groups A and C), where clean closure had not been performed, samples of the residual materials and the native soils adjacent to and underlying the SWMUs were collected and analyzed for Appendix IX parameters to characterize the nature of these materials. This was done to determine whether there had been a release of hazardous waste or hazardous waste constituents into these soils.
- At six of the SWMU Groups (Groups D, E, F, G, H, and I) and four of the AOCS (A, B, C, and F), soil samples were collected and analyzed for Appendix IX parameters to determine if hazardous waste or hazardous waste constituents had been released into the native soils adjacent to or underlying these locations. Where field observations indicated that contamination was present in the uppermost native soil, additional soil samples were collected at greater depths to characterize the vertical extent of migration.
- At SWMU Group B, a water sample was collected from the capillary drainage layer that underlies the TSCA closure cell. This sample was analyzed for Appendix IX parameters, as part of the Phase I RFI groundwater sampling activities, to determine if the closure cell contents have affected adjacent soils. The TSCA closure cell was constructed over the clean-closed SWMU #4, #5, and #7. There is continual inward flow of groundwater to the drainage layer; this groundwater has traveled through the clean-closed soils of the former SWMUs.
- At AOC H, sediment samples were collected from Meyer's Ditch and Little Raccoon Creek and analyzed for Appendix IX parameters. This was done to characterize residual effects of a single large release of processed acid wastewater that reached this drainageway.

- At three SWMUs within Group I (#43, #44, and #45), chloride samples were collected and analyzed as an indicator of leakage from these SWMUs, which are used exclusively for managing sanitary waste produced at three of the onsite buildings.
- Groundwater samples were collected from 10 existing monitoring wells (L-17, L-19A, L-20, L-25 and L-26, MW-14R, MW-15R, MW-20R, and MW-22R) to confirm recent groundwater monitoring data from these wells. These monitoring wells are located within the main facility area and positioned to detect releases (if any) from land-based SWMUs and AOCs that still contain residual (stabilized) waste materials. MW-24R, a background well located outside the active facility area, was also sampled as a reference point.

4.2.2 Approval by EPA

After several revisions, the WP was approved by USEPA Region 5 on October 29, 1998. The USEPA did not have a separate on-site representative during the RFI field work. The OEPA representative that is normally on site as a condition of the facility's RCRA permit was on site during all of the RFI field work. Minor modifications to procedures outlined in the WP were reviewed and approved by USEPA and OEPA prior to implementation, as described below in Sections 4.3.2.1 and 4.13.

4.2.3 Sample Collection Methods

The Phase I RFI included collecting 312 soil, 14 sediment, and 16 groundwater samples in the identified SWMU groups and AOCs. Specific sample locations and collection procedures utilized for each medium are described in the following sections of this report. All sampling, analytical, and quality-assurance procedures were developed based upon USEPA guidance and were included in Appendix A of the QAPP. Sample handling and chain-of-custody (COC) procedures developed for this project were also based upon USEPA guidance and were included in Appendix A of the QAPP.

Thirty-nine soil samples and five duplicate samples, approximately 10% of the total number, were collected and analyzed for geotechnical and geochemical properties. These properties included: cation exchange capacity (CEC), Atterberg limits, moisture content, grain-size distribution, soil pH, and Total Organic Carbon (TOC). In general, American Society for Testing and Materials (ASTM) specifications and standard operating procedures (SOPs) were followed for these tests, as presented in Appendix A of the QAPP. The geotechnical information was collected for possible use later in the project or in the QRA.

4.3 Sampling Procedures

The following procedures were conducted during sample collection activities, and were recorded in a project field notebook and on the sample chain-of-custody forms, as indicated below. A field quality control form was also completed at the end of each day and included the day's sampling activities. The field quality control forms are presented in Appendix A.

4.3.1 Preliminary Sampling Activities

Sampling personnel used a bound field logbook with moisture-resistant pages to record pertinent sampling information with waterproof ink. Daily field activities and sampling information were entered in the field logbook on dated, initialed, and serially-numbered pages. Any corrections made to entries were initialed and dated line-out deletions. A diagonal line was drawn across the remaining blank space of the last page of each day's entry. Each day's entry was signed and dated by the author.

Field personnel recorded any preparation activities that were pertinent to sample collection at each sampling location. For soil sampling, this included: observations of surface staining, water saturation or ponding; proximity to roads or waste piles; significant upgradient physiographic or hydrogeologic features; background volatile vapor concentrations; the sample depth; and the drilling method, equipment, and materials (such as drilling mud) that were used. The field logbook also included the following:

Sample Identification

A unique identification number was assigned to each sample in accordance with the procedures described in Section 6.1.3 of the WP. All soil and sediment samples were identified according to the following sample numbering system:

SSS:MM:LLLL-XX-YY

where: SSS is the "site" location,
MM is the media sampled,
LLLL is the sampling "location" designation within the "site",
XX is the sequence number of samples at that "location", and
YY is the QA/QC sample identifier, if any.

Examples of site locations include "S01" for SWMU 1 and "ACH" for AOC H. Where individual SWMUs overlapped within SWMU Groups A, B, or C, samples were assigned to the site they best represented.

Media identifiers include "SW" for stabilized waste materials, "SL" for soil (surface or subsurface) and "SD" for sediment. Examples of location designations within a site include "SL01" for the first "select" soil sampling location, and "GNB2" for the grid node sample in row B, column 2. "Select" location and "grid node" samples are discussed below in Section 4.3.2. Location designations were noted in the field on copies of the figures from Section 5 of the WP. The first sample collected at any location was designated "01", the second "02", etc. The following example illustrates the use of this numbering system:

S14:SL:GNC1-01-FD

where: S14 indicates the sample was collected from SWMU 14,
SL indicates that it was a soil sample,
GNC1 indicates a grid node (GN) sample collected at grid row C, column 1,

01 indicates the first sample collected at this location, and
FD indicates that it was a field duplicate sample.

Groundwater samples were identified using the existing monitoring well identification system where "L" was used to identify lacustrine wells and "MW" was used to identify bedrock wells. QA/QC sample identifiers included "FD" for field duplicate, "FB" for field blank, "MS" for matrix spike, and "MD" for matrix spike duplicate.

All information pertaining to a particular sample was referenced by its identification number. This number was also recorded on the sample container label and on the sample COC form. Sample container labels were completed in waterproof ink with the appropriate information and secured to the container. Container labels and COC forms included the following information:

- Sampling personnel;
- Date and time of collection;
- Field sample location and depth (if appropriate);
- Observations on ambient conditions;
- Type of sampling (composite or grab);
- Method of sampling;
- Sampling matrix or source;
- Results of field screening;
- Intended analyses;
- Preservation method;
- Observations of significant characteristics of the sample; and
- Observations of significant effects on sampling procedures.

Sample Container Data

Earth Tech used glass sample containers furnished by the subcontracted laboratory. Earth Tech verified that the manufacturer (I-Chem, Inc.) furnished laboratory-grade, certified clean containers. Glass sample containers arrived onsite with the original certifications from the manufacturer. The source and lot numbers of each shipment of sample containers were recorded in the field logbook.

EnCore™ plunger-type samplers were used to collect all soil VOC samples. The EnCore™ samplers were sent to the site directly from the manufacturer (EnNovative Technologies, Inc.). Earth Tech verified that the date and time of packaging and inspection was listed on each shipping container, and that each sampler was sealed in an individual plastic bag.

Sample Location, Sample Media, and Analytical Parameters

An accurate description of each sampling location was noted in the field logbook. Sampling locations were referenced to a site location map from the FSP. The type of sample media was recorded with the sample identification number in the field logbook and on the COC form. The analyses to be performed by the laboratory were recorded with the sample identification number in the field logbook and on the COC form.

Date, Time, Personnel, and Ambient Conditions

The date, time of sample collection, and the personnel who conducted the sampling were recorded with the sample identification number in the field logbook and on the COC form. The names of visitors and any other persons at the sampling location during sample collection were recorded in the field logbook. Ambient weather conditions and any other conditions at the sampling location that may have affected sample collection, the apparent representativeness of the sample or its analysis were also recorded.

Sample Collection Protocol

Field personnel recorded the type of equipment used to conduct sampling and the order of sample collection in the field logbook. Sampling for VOCs was followed by SVOCs, PCBs, pesticides, herbicides, dioxins/furans, and metals (as required based on the parameters actually targeted at each sampling location). Field-screening results measured during sampling collection (such as vapor headspace readings of soil samples), special collection procedures, and aberrations to sampling procedures were also noted at this time.

Field personnel wore new pairs of disposable gloves during the collection of all RFI samples. Disposable gloves were worn while opening sample containers for sample containerization or preservation. Whenever gloves became torn or contaminated, they were replaced with a new set of gloves before continuing sampling activities.

Following collection, the sample identification number and other information on the sample label were verified with the entry in the field logbook. Sample identification number, time, and date of collection were recorded on the COC form. Samples were then placed in coolers with sealed bags of wet ice; all sample coolers were maintained in the sampler's presence or in a secure location for the remainder of the daily sampling activities. Custody of the samples was also maintained during shipment to the laboratory by sealing the coolers against tampering with custody seals.

4.3.2 Soil and Sediment Sample Collection Procedures

Sampling procedures used to collect subsurface soil, surface soil, and sediment samples are described in the following sections. A description of individual samples collected at each SWMU Group and AOC is presented in Section 5 of this report.

Two unique procedures were used to collect subsurface soil samples, depending on the sample type. The Phase I RFI WP described two types of subsurface samples: "select location" samples and "grid node" samples. These two types of samples were collected within SWMUs that were previously used as surface impoundments. All geological information collected during the collection of subsurface samples was recorded on the Borehole Log Forms presented in Appendix B.

Similar procedures were used when collecting subsurface samples in SWMUs that were not previously surface impoundments. Where procedural modifications were necessary, they are noted in Section 5 of this report, within the discussion of sampling results for each SWMU or SWMU Group.

4.3.2.1 Select Location Sampling Procedures

The purpose of "select location" sampling was twofold, depending on the SWMU being sampled. Select location sampling within former surface impoundments was done to characterize the stabilized waste within the impoundment. Select sampling at the other SWMUs was conducted to evaluate whether there was a release from a potential source of contamination (e.g., an underground storage tank).

The presence of waste constituents is expected within select location samples collected within the former impoundments, particularly SWMU Groups A and C, since the sampled material consisted of stabilized waste materials. The presence of constituents within these samples does not provide an indication of migration or exposure potential. Migration and exposure potential will be considered in the future QRA.

Select location soils were sampled from three feet below the ground surface until borehole termination criteria (described below) were met. Soil samples were screened for VOCs in a controlled manner to identify the depth interval containing the highest VOC concentrations. A sample from the depth interval with the highest VOCs concentration was submitted for laboratory analysis. Boreholes were advanced using hollow-stem augers and split-spoon samplers, similar to the grid node sampling methods.

Headspace screening was conducted on all split-spoon samples in the following manner:

- The split spoon was removed from the borehole, and a small amount of soil from the uppermost portion of the split spoon was placed in a 4-oz glass jar. The jar was covered with disposable polyethylene plastic wrap and sealed with a rubber band. The glass jar was then placed in a microwave oven for twelve seconds.
- After 12 seconds, the sample was removed from the microwave and the plastic wrap was punctured with the PID probe. Relative VOC concentrations were recorded on the headspace analysis forms as presented in Appendix A.

Whenever headspace readings greater than zero or background were recorded, soil was collected immediately from the uppermost portion of the soil core using three EnCore™ samplers. The EnCore™ samplers were placed in a re-sealable polyethylene bag, labeled, and placed in an iced field cooler. Soil for analysis of the additional Appendix IX parameters was collected from the remaining soil core and placed into laboratory-supplied containers. Each container was labeled and placed within a field cooler with its internal temperature maintained at 4°C for transport to the laboratory. If headspace readings were less than background or zero, the soil core sample was discarded. Only the soil samples with the highest gross VOC concentrations (based on the results of the above headspace analysis method) were sent to the laboratory for analysis.

The procedure for warming the soil samples prior to headspace analysis was modified based on field-testing conducted at the beginning of RFI fieldwork. The WP specified placing each soil sample in a re-closeable polyethylene bag, then immersing the bag in warm water, heated by a crock pot, for fifteen minutes. Based on the results of field tests conducted by Earth Tech at the site on March 12, 1999, this procedure was modified by heating the samples in a microwave oven for twelve seconds. The twelve-

second time interval duplicated the warming achieved by the crock-pot method, based on side-by-side test results.

Additionally, the re-closeable polyethylene bag specified in the WP was replaced with a glass jar covered with plastic wrap, secured with a rubber band. It was determined during the field tests that component(s) of the polyethylene bags volatilized when heated. No evidence of volatilization was observed from the plastic wrap. The USEPA was notified of this modification in a March 9, 1999 telephone conversation and a March 12, 1999 letter, as well in the March 1999 monthly progress report.

Where field observations indicated that contamination was present in the uppermost native soil beneath the SWMU, two additional samples were collected for analysis; a sample of uppermost native soil, and a soil sample from a greater depth to characterize the vertical extent of contamination. To collect the "vertical extent" sample, the borehole was advanced using hollow-stem augers (HSA). Soil cores retrieved with split-spoon samplers were screened for VOCs. When it appeared that contamination was no longer present, the "vertical extent" soil sample was collected for analysis.

The "vertical extent" sample was collected, and the borehole was terminated, when the following criteria were met:

- headspace analysis did not detect evidence of gross VOCs,
- identification of soils encountered did not indicate visual contamination, and;
- historical information supported the decision (i.e., depth of termination was below the recorded bottom depth of surface impoundments).

If VOCs were not detected in the soil samples, a sample was selected for laboratory analysis based on the visual appearance of the soils, in combination with information collected from surrounding grid node borings. All samples were labeled and stored in an iced field cooler prior to shipment to the laboratory. The borehole was then abandoned using the procedures described in Section 4.13.

4.3.2.2 Grid Node Sampling Procedures

The purpose of grid node sampling was to obtain samples of natural soil material from a uniform depth (2 to 4 feet) below the bottom of a former surface impoundment. The analytical results from the grid node samples provide evidence of whether a release from a SWMU has occurred. Significant concentrations of target constituents would not be expected in a grid node sample if the overlying SWMU did not release contamination.

The first objective during drilling was to determine the depth to the bottom of the former impoundment. The second objective was to then collect a soil sample for laboratory analysis from natural soil approximately 2 to 4 feet below this depth.

The first objective at grid node locations was accomplished in the following manner:

- A borehole was advanced using a HSA to a depth of three feet.

- A split-spoon sampler was then driven into the soil. From this depth, continuous split-spoon samples were then taken at 2-foot intervals. This allowed the field geologist to record a continuous visual record of the soils.
- The field geologist noted important interfaces or changes in lithology with depth, and recorded a detailed description of the material encountered. Field experience indicated that the 2-foot split spoons, rather than the 5-foot continuous corers discussed in the WP, were more accurate in distinguishing the interface between the bottom of the former impoundment and native soil.
- A PID was used to screen the soil cores as they were retrieved. This information was recorded for qualitative purposes and used to obtain background readings on the gross VOC concentrations of the soil. The soil core was screened using the following procedures:
 1. The PID was placed next to the split-spoon sampler as it was opened, measuring gross VOC concentration from the soil core.
 2. The PID readings were recorded in the field logbook and on the borehole log by the field geologist.
 3. In areas where PID readings were elevated relative to others, the field geologist split the core with a stainless-steel pocketknife and screened the material within the core. These readings were also recorded in the field logbook and on the borehole log. A summary of daily drilling production was recorded. Daily field report forms are presented in Appendix C.
- Based on visual appearance of the sample, interface changes, depth encountered and historical data, the field geologist determined the bottom of the former impoundment. A sample of natural soil was collected for laboratory analysis using the following procedures:
 1. The split-spoon sampler was then driven into the soil at the appropriate sampling interval (approximately 2 to 4 feet below the bottom of the former impoundment). If fixed waste was not identified within the borehole during drilling, the soil sample was collected at 2 feet below the deepest recorded depth of the impoundment.
 2. The split spoon was opened, and a VOC sample was collected immediately using three EnCore™ plunger-type samplers. The VOC samples were collected from the uppermost portion of the soil core. These samples were sealed in a re-closeable polyethylene bag, which was placed in a field cooler to await transportation to the laboratory for Appendix IX VOC analyses. These samples were preserved at the laboratory within 48 hours of sample collection. Two of the samples were preserved at the laboratory with sodium bisulfate, and one was preserved with methanol. These samples were preserved after extrusion into 40-ml vials.
 3. Additional soil was collected from the split spoon and placed into laboratory-provided containers for analysis of the remaining Appendix IX parameters.

Dry-weight determinations for all soil samples were made using bulk-sample soil that was not needed for other analyses. Collection of a separate aliquot for dry weight was not necessary for this project.

All samples were labeled and stored in an iced field cooler prior to shipment to the laboratory. The borehole was then abandoned using the procedures described in Section 4.13.

Where field observations indicated that contamination was present in the sample collected 2 to 4 feet below the bottom of the former impoundment, one additional soil sample was collected at a greater depth to characterize the vertical extent of contamination. These deeper samples were collected as described above.

4.3.3 Surface Soil Sample Collection Procedures

Surface soil samples were collected in the following manner:

- A split-spoon sampler was driven from 0-2 feet bgs.
- The uppermost soil within the split spoon was sampled with three EnCore™ samplers and sent to the laboratory for analysis of Appendix IX VOCs.
- Additional sample material for analysis of the remaining Appendix IX parameters was collected from the remaining soil in the core. This sample was placed in laboratory-provided containers and stored in an iced field cooler prior to shipment to the laboratory.

Where field observations indicated that contamination was present in the 0- to-2-foot sample, the WP specified collection of an additional soil sample at a greater depth to characterize the vertical extent of contamination. However, field observations during surface-soil sampling did not indicate the need to collect additional samples at any of these points.

All boreholes left by the sampling device were filled with granular bentonite. Potable water was then poured into the borehole to hydrate the bentonite and create an impermeable seal.

4.3.4 Sediment Sample Collection Procedures

Because effective sediment sampling requires samples to be collected from depositional areas, field personnel used field observations to determine the exact sampling sites. Typical depositional areas are located upstream of obstructions in the water or within zones of relatively non-turbulent flow. Sampling locations that were selected based on observations were recorded in the field logbook, located and numbered on the field site map, and staked in the field. Sediment samples were then collected from the stream bank at the water surface and/or at the center of the stream. Wading was required to collect the samples, and sampling locations were approached from the downstream direction.

At each sampling site, a discrete VOC sample and a composite non-VOC sample were collected. The VOC samples were collected using three EnCore™ samplers; these samples were preserved at the laboratory. Non-VOC samples were collected using a decontaminated stainless-steel spoon. The non-

VOC sample was placed in a stainless-steel mixing bowl, gently mixed and quartered, and then carefully placed into laboratory-supplied containers. The stainless-steel spoon was used to obtain a spoonful of sample from each quarter in succession until all of the sample containers were completely full, or until no more sample was available.

4.4 Groundwater Sampling

Groundwater sampling was conducted in accordance with procedures described in the facility's Groundwater Sampling and Analysis (GWSA) Plan under the direction of the site's Environmental Manager. Groundwater samples were collected from ten monitoring wells and the TSCA Closure Cell capillary drainage piping.

Prior to sampling, each well was purged to evacuate three well volumes of water or until the well ran dry. Groundwater depth in each well was determined using an electric water level meter provided by the site. Well volumes were calculated using the following equation:

$$V = \pi r^2 h$$

where: $\pi = 3.1415$

r = radius of well casing

h = height of water column in well

V = volume of water in well

Low-yield wells were purged twenty-four hours prior to sampling to allow for recovery. Field instrument readings were collected for all monitoring wells. Field readings were collected prior to the start of purging and after evacuation of each well volume. Field readings consisted of pH, temperature, specific conductivity, and turbidity and were collected using the following field units:

- pH/temperature--Fisher Accumet Model 955
- Conductivity--Cole Palmer Model 4070
- Turbidity--LaMotte Model 2020

Groundwater purging and sample collection was performed using dedicated 1-liter stainless steel bailers for monitoring wells L-17, L-19A, and L-25. All additional well purging and sample collection was performed using dedicated Well Wizard bladder pumps. Due to low yield, wells L-17, L-19A, L-20, L-25, and L-26 ran dry during purging. These wells were allowed to recharge overnight before samples were collected. Well L-17 recovered only enough to provide sufficient sample volume for volatiles analysis. Water collected for dissolved metals was field filtered, using a disposable, 0.45-micron filter, prior to preservation. All purge water was discharged to the ground surface downslope from the monitoring well.

Samples were also collected from the capillary drain piping system, which discharges to a sump located on the north side of the TSCA Closure Cell. The drain system discharges to two pipes, one running from the western portion of the closure cell to the sump, and one running from the eastern portion to the sump. Because the flow from the pipe from the western portion was very low, samples were collected only from

the eastern-portion discharge pipe. Volatile organic sample bottles were filled directly from the pipe discharge using equipment provided by the site. A dedicated stainless-steel bucket, provided by the site, was used to collect the remaining sample volume needed to fill the other sample bottles. Samples collected for dissolved metals analysis were field-filtered using a disposable, 0.45-micron filter, prior to preservation. The samples were placed in laboratory-provided containers and stored on ice in a field cooler prior to shipment to the laboratory.

Due to field conditions, groundwater samples were not all collected on the same day. Also, due to sample container breakage, some wells had to be re-sampled after the initial groundwater sampling round. Because of the different sampling dates, some of the analyte groups were duplicated for some samples. These events are summarized below.

- Wells L-17 and L-25 were purged dry on April 30, 1999. Due to low recharge, only volatile samples were collected from L-17 on the following day. On May 2, 1999 a complete set of sample bottles was collected from well L-25.
- Wells MW-14R, MW-15R, MW-20R, and MW-22R were purged and sampled on May 3, 1999. The capillary drain and capillary drain duplicate sample, the well MW-22R duplicate sample, and the MW-24R matrix spike and matrix spike duplicate samples were also collected on May 3, 1999. Wells L-19A, L-20, and L-26 ran dry while purging and were sampled the following day. A sample from well MW-24R and a field blank from the dedicated bailer in well L-19A were collected on May 4, 1999.
- Additional groundwater samples were collected from monitoring wells MW-14R, MW-20R, L-19A and L-20 on May 6, 1999, due to sample breakage during shipment to the laboratory. The laboratory was able to obtain sufficient sample volumes for the required analysis using these additional samples. None of these samples were composited; the additional samples were used to complete analysis of the remainder of the Appendix IX parameter groups.
- Due to sample bottle breakage, additional sampling was also performed on May 6 and 12, 1999. On May 6, monitoring well L-25 was purged, well MW-22R was purged and re-sampled for all parameters, and a field duplicate was collected. On May 12, 1999, well L-25 was re-sampled, and a field blank was collected from the dedicated bailer in well L-19A. A complete set of sample bottles (other than volatiles) and a field duplicate were also collected from the capillary drain. In addition, well MW-24R was purged and re-sampled for all parameters, and a matrix spike and matrix spike duplicate were also collected.

4.5 Analytical Parameters

All Phase I RFI samples collected in the field were analyzed for Appendix IX VOCs, SVOCs, pesticides (organochlorine and organophosphate), PCBs, herbicides, metals, cyanide, sulfide, chloride, and dioxins/furans. Analytical methods corresponded to those listed in *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition, Final Update 3 (USEPA, June 1997). The parameters and associated analytical methods are shown in Tables 4-2 and 4-3. This information was presented in the QAPP and approved as part of the WP. The QAPP also presented the laboratory SOPs and SW-846 (3rd Edition) methods on which SOPs are based.

4.6 Sample Custody

Sample collection and custody procedures were designed so that field custody of samples was fully and continuously maintained and documented. These procedures provided complete identification and documentation of the sampling event and the sample COC from shipment of sample bottleware, through sample collection, to receipt of the samples by the subcontracted laboratory. When used in conjunction with the laboratory's custody procedures and the sample bottleware documentation, these data establish full legal custody and allowed complete traceability of a sample from preparation and receipt of sample bottleware to sample collection, preservation, and shipping, through laboratory receipt, sample analysis, and data validation. The COC Record Forms are presented in Appendix A.

Field custody procedures are described below as two groups: (1) sample collection procedures that document the sample identification, sampling personnel, sample collection procedures, sample preservation, and ambient conditions during sampling activities; and (2) sample shipment procedures that document handling, packing, and shipping of samples to the laboratory. The sample shipment procedures are presented in the QAPP in Section 5.1.

A sample was considered to be in a person's custody whenever it was in a person's physical possession, when it was in view of the sampler or responsible party, or when it was in a secure location. The persons responsible for sample custody, and a brief description of their duties, are:

- Laboratory Representative or Commercial Supplier: verified that the bottleware was certified clean; arranged for bottleware shipment to Sampling and Equipment Manager;
- Earth Tech Field Staff: received and stored bottleware shipped from the laboratory; inspected bottleware for physical integrity; collected and preserved samples; verified samples to COC form; prepared samples for shipment; retained bottleware and samples under custody until sample shipment; relinquished samples to shipping courier.
- Earth Tech Project Manager: assured that COC documentation was incorporated into the project file.

4.7 Quality Control Sample Collection

As required by the QAPP, several quality control (QC) checks were built into the field program. These included collection of QC samples and maintenance and calibration of field instrumentation. These elements are discussed below. In addition, Earth Tech conducted two quality assurance audits during the fieldwork, on March 26, 1999 and April 28, 1999, in accordance with the approved WP. These audits were conducted by the project Quality Assurance Officer, and included a review of field practices for compliance with the QAPP and discussion and resolution of specific situations involving fieldwork or the laboratory. The project Quality Assurance Officer also conducted a QC review of the analytical laboratory on March 10, 1999. As a result, several recommendations were implemented to improve the quality of data developed during the Phase I RFI.

4.7.1 QC Samples

Several types of QC samples were collected in the field, including duplicates, matrix spikes (MS) and matrix spike duplicates (MSD), field blanks, and trip blanks. Information on QC samples was recorded in the field logbook, on the sample bottle label, and on the COC form. Duplicate samples had the same information and were recorded as individual samples. Trip blanks had this same information recorded, with the exception that sample location, sample screening and preliminary activities were not applicable. A summary of these QC samples and their collection frequency and analyses is provided below.

Duplicates

Duplicate samples were collected to provide precision information for the entire measurement system including sample acquisition, homogeneity, handling, shipping, storage, preparation, and analysis. Duplicate analyses were performed for 1 out of every 10 investigative samples for each matrix submitted to the laboratory. A total of 24 soil and 2 water duplicates were collected during the onsite investigation. Additionally, 5 geotechnical duplicate samples were collected during the onsite investigation.

Matrix Spike/Matrix Spike Duplicates

MS and MSD samples were collected in the field during sample acquisition and used to assess analytical precision and accuracy for organic analyses. A Laboratory Duplicate (LD) was used in place of a matrix spike duplicate to assess analytical precision and accuracy for inorganic analyses. MS, MSD, and LD analyses were performed for 1 out of every 20 investigative samples for each matrix submitted to the laboratory. The MS, MSD and LD samples were analyzed for the parameters of the primary sample. A total of 17 soil and 1 water MS/MSD samples were submitted to the laboratory.

Field Blanks

Field blanks provide an indication of ambient conditions and/or equipment conditions that may potentially affect the quality of the associated samples. Field blank samples can be collected from sampling devices to provide a representative indication of the success of field cleaning procedures for the same matrix of the initial sample being collected (i.e., field blanks were not collected for soil and sediment samples). In accordance with Table 1-1 of the QAPP, one field blank sample was obtained by pouring deionized water supplied by the laboratory through a dedicated stainless steel bailer, and placing it in appropriate sample containers for analysis. Prior to field blank sample collection, the bailer was decontaminated by triple rinsing with deionized water.

Trip Blanks

Trip blanks were prepared in the laboratory, shipped with the sample containers to the site, and kept with the investigative samples throughout the sampling event. They were then packaged for shipment with the other samples and submitted for analysis. A trip blank was included with each shipment of aqueous samples requiring VOC analysis.

Blank Water

The blank water used for the field blanks and trip blanks consisted of deionized water provided by the laboratory performing the analysis. The source of this water was the same as that of the method/preparation blank. The blank water was received in the field within one day of laboratory preparation, was onsite for a maximum of two days, shipped back to the laboratory at the end of the second day and was received at the laboratory within 24 hours.

4.7.2 Field Instrument QC

Proper measurement of accuracy and precision of field instruments was verified by daily instrument calibration and QC checking procedures described in the QAPP. This information was recorded on the Equipment Calibration Logs and in the Daily Quality Control Reports presented in Appendix A. This information was reviewed daily by the Earth Tech Field Team Leader, who audited the accuracy and precision of the field screening instruments.

4.8 Data Validation

Analytical data packages provided by the laboratory were reviewed to validate the data and qualify its use for the Phase I RFI and QRA. The data were evaluated using the USEPA national functional guidelines for organic and inorganic data review (1994). Quality-control limits generated by the laboratory were used for comparison with the analytical QC data, rather than the limits prescribed by Contract Laboratory Program (CLP) protocols, because the Phase I RFI was not required to follow CLP procedures. Where analytical data were found to be out of compliance with the laboratory QC limits, qualifiers (flags) were attached to the data. The flags that were assigned included:

J-- sample results are estimated due to out-of-compliance QC data

R-- sample results are not usable due to grossly out-of-compliance QC data

C-- the original result was changed by the validator to correct for associated blank contamination or because a related analysis (e.g., re-analysis, dilution) was more appropriate.

Review of the analytical data packages indicated that the laboratory generally conducted the analyses in accordance with the specific protocols for the USEPA analytical methods that were selected for the project. Of the 57,483 data values that were evaluated, 99.7 percent were considered fully compliant and usable (including estimated values). Data that were qualified were flagged for three primary reasons:

- the laboratory analyzed many of the organic samples on or near the last day of available holding time, a common practice with environmental laboratories. As a result, samples that exhibited common analytical problems (such as poor surrogate recovery or internal standard response) were not re-analyzed until after the holding time had expired. Sample data thus had to be qualified as estimated, either due to the expired holding time or the QC problems.

- analytical instrument calibration data did not meet the requirements specified in the USEPA guidelines, which resulted in many organic data values being flagged as estimated.
- matrix interference in some samples resulted in poor internal standard responses. These samples were re-analyzed, but for some of the SVOC analyses, the data had to be qualified as estimated due to expired holding times.

A complete discussion of data validation procedures and results is provided in the Data Validation Summary Report included with the analytical data (Appendix I).

4.9 Potable Water Supply

Potable water was used during the field investigation for equipment decontamination, grout preparation, and drilling operations. The WP indicated that the on site truck wash well would be used as the source for decontamination water. The water from this well has high concentrations of suspended solids and sulfides, so potable water was obtained from the City of Clyde (Ohio) Municipal Water Supply Station. The Clyde Municipal Water Supply Station is located south of the site on South Route 510. A 1,000-gallon polyethylene tank, purchased new for the project, was used to transport and store the water onsite. Prior to field operations, this potable water was sampled and analyzed for Appendix IX parameters using appropriate USEPA methods. The results of these analyses are presented in Table 4-4. This source of water was found to be adequate, and was used for all onsite decontamination for the remainder of the Phase I RFI.

4.10 Decontamination Procedures

4.10.1 Decontamination Area

A dedicated equipment decontamination area for the field investigation was located at the Truck Unloading Facility. This facility had the available containment and access to the treatment facilities needed to manage the liquids generated during the decontamination process. Equipment decontamination was centralized in an unused wash bay in this area. Decontamination water was collected through dedicated floor sumps, treated by the onsite integrated aqueous waste treatment system and ultimately disposed through the deep well system. Personnel decontamination was completed in centralized areas where the sampling activities were being conducted.

4.10.2 Decontamination Procedures

Drilling equipment (including drill rods, bits, and augers) were decontaminated using a high-pressure steam cleaner prior to the beginning of field activities and between each borehole. In accordance with the approved WP, split-spoon samplers were decontaminated before use and between boreholes according to the following procedures:

- Washed using laboratory-grade glassware detergent (Alconox) in potable water to remove visible contamination;

- Generous potable water rinse; and,
- Distilled water rinse.
- Total air dry; when necessary, compressed nitrogen was used to expedite drying.

This cleaning method was sufficient to remove all visible contamination. No other cleaning method was necessary during the field investigation.

All cleaned sampling devices were wrapped in aluminum foil, after the decontamination process was completed. All decontamination information was recorded in the field logbook.

All heavy equipment was decontaminated in the Truck Unloading Facility using a combination of pressure/steam cleaning and manual scrubbing. Steam cleaning was used to remove visible debris; if visible contamination still existed after the steam cleaning was completed, manual scrubbing of the equipment was completed followed by another round of steam cleaning.

All drilling rig items such as auger flights, rods, drill bits, or any other equipment which came into contact with soils were decontaminated between boreholes.

4.10.3 Investigation-Derived Wastes

Investigation-Derived Wastes (IDW), included soil cuttings, decontamination fluids, disposable sampling equipment and disposable personnel protective equipment.

All soil cuttings were collected by the drillers as they were brought to the surface and containerized in the bed of their truck. The truck bed was lined with enough plastic to cover the soil cuttings during transport between boreholes and to the waste consolidation area. Twenty-cubic yard roll-off containers provided by the facility was used to consolidated all waste generated during the investigation. Safety Kleen (the approved waste disposal subcontractor for the site) removed the waste and transported it to an appropriate disposal facility.

All decontamination fluids were collected and treated by the onsite Integrated Aqueous Waste Treatment System prior to disposal in the facility's deep well injection system. Disposable sampling equipment and personal protective equipment (PPE) was double-bagged and consolidated with all other project waste in the roll-off container.

4.11 Geophysical Investigation

The Phase I RFI included a geophysical investigation that was conducted to determine if abandoned underground piping, which was replaced by the above-ground transfer pipelines, had been removed. Facility records that documented the locations of underground piping were inspected; this was followed by a Ground Penetrating Radar (GPR) pilot test. The pilot test was conducted in an area where underground piping was known to exist to determine if the natural soils (clays) have a masking effect on the ability of this technology to identify subsurface piping.

The abandoned underground piping was installed at an approximate depth of 4 feet below ground surface (bgs). Facility records indicated that most, if not all, of the piping was removed. The underground piping reportedly was constructed of PVC, fiberglass, steel, or ceramic materials. Gravel-lined pipe trenches and potential concentrations of gravel or loose fill near the pipe trenches were suspected as potential pathways for contamination resulting from incidental spills in the roadways or transfer areas, or from previous surface impoundments at the site.

A GPR system from Geophysical Survey Systems, Inc. (GSSI) was selected for the geophysical survey. In addition to the GPR equipment, a Geonics EM-31 electromagnetic induction instrument was selected to confirm the pilot test data. The field team selected several survey locations where potential abandoned piping was suspected, based on facility documentation, and both geophysical instruments were calibrated in the field. The field team tested the GPR unit over a 2-foot diameter metal culvert at an approximate depth of 3 feet bgs, adjacent to Filter Building No. 2. The GPR system showed excellent resolution of this object. However, the EM-31 could not be calibrated using the culvert as a target, due to the steel culvert material and the presence of nearby power lines. The EM-31 was successfully calibrated over a 2-inch diameter pipe made of iron.

GPR testing was performed in the four survey areas mentioned above, and the collected data were manipulated and analyzed utilizing GSSI's RADAN software package. The GPR system detected a few anomalies in survey areas A, B, and D. Each of these locations was investigated by excavating test pits (discussed below). Only one location was found to contain a 2-inch diameter fiberglass pipe; the other three locations consisted of backfill, which may indicate a previous pipe trench that was removed and then backfilled with gravel and cobbles. Overall, the GPR system was ineffective for locating buried piping or pipe trenches, possibly due to the presence of dense clays in the subsurface, and rainfall during the field effort. Some clays and water are both conductive materials that cause the signal from the GPR system to dissipate prematurely. The EM-31 survey results were also inconclusive, due to the presence of overhead power lines and the subsurface conditions described above (dense clays, rainfall).

Following the relatively inconclusive geophysical testing, test pits were excavated in all of the suspected piping areas to directly observe evidence of underground piping. The test pits were excavated to a depth of 6 feet bgs to allow for sampling and direct visual characterization of any residual wastes or underground piping that might be encountered. All test pits were excavated with a backhoe; the orientations and dimensions of the test pits were determined in the field based on the historical information and GPR data. A summary of test pit findings is provided in the following table.

Test Pit	Dimensions (feet, LxW)	Soil Types	Evidence of Piping	Samples Collected
TP-1	10 x 4	Light to dark-brown silty clay	None	None
TP-2	25 x 4	Dark brown silty clay	None	None
TP-3	37 x 3	Dark brown silty clay	None	None
TP-4	30 x 3	Dark brown silty clay	None	None
TP-5	15 x 3	Gray, black, tan cobbles, sand, silt and clay (backfill)	Possible	TP-5
TP-6	10 x 3	Cobbles, sand, silt and clay (backfill)	Possible	TP-6
TP-7	20 x 3	Cobbles, sand, silt and clay (backfill)	Possible	TP-7
TP-8	(hand auger)	Dark brown silty clay	Abandoned pipe present	TP-8

Test Pits 1, 2, 3, 5, 6, and 7 were located in areas where geophysical data were collected, and they confirmed the GPR results. Test Pit 4 was located near Pump House No. 2, where historical information suggested the presence of underground piping, but none was encountered. Test Pit 8 was hand-augered under an active aboveground pipeline. The previous piping was exposed in a trench beneath this pipeline and was more easily accessible with a hand auger than with an excavator.

Test Pits 1, 2, and 3 showed no evidence of contamination or piping, so no soil samples were collected at these locations. The subsurface conditions at Test Pit 4 also gave no indication of contamination or previous piping, so no sample was collected. In Test Pits 5, 6, and 7, evidence of underground piping and/or potential contamination was observed. For this activity, potential contamination was defined as soil that showed discoloration, odors, or free product. A sample was collected from the bottom of each of the latter three test pits.

All test pit samples were collected with a 3-inch diameter, stainless steel hand auger from the bottom of the excavation, or from the area that displayed the most evidence of potential contamination. Soil samples collected within this SWMU were analyzed for Appendix IX parameters described in Section 1.4.2 of the QAPP (see Table 4-2).

4.12 Health and Safety Procedures

Health and safety procedures that were implemented during the field activities are described in the HASP. These procedures included measures to control site security and access to the investigation areas. In addition, Earth Tech conducted two safety audits during the fieldwork, on March 23, 1999 and April 21, 1999, in accordance with the approved WP. These audits were conducted by a health-and-safety specialist from the Earth Tech's Grand Rapids, Michigan office. The auditor used standardized audit forms to review compliance with Earth Tech's environmental health and safety policies and procedures and the HASP. The auditor also reviewed field practices and addressed specific situations that arose during fieldwork. As a result, several recommendations were implemented to improve health and safety practices during the Phase I RFI.

The objectives of site security during the field investigation were to control access to the site during the Phase I RFI and prevent vandalism and theft of equipment. The facility is manned 24 hours a day, seven days a week, and is surrounded by a 6 foot-high chain-link fence. Signs are mounted every 100 to 150 feet on the perimeter fence. The signs are visible from 25 feet away and carry the message: "Danger-Unauthorized Personnel Keep Out". During normal administrative hours, all visitors are required to sign a visitor's log, and state their business. All non-complying individuals are treated as unauthorized entrants and are asked to leave the facility. The fence and control gates are also monitored around the clock on closed-circuit television.

The facility has two gates used for vehicle entry, both accessible from State Route 412. These gates are referred to as the "receipt control gate" and the "guardhouse gate". The receipt control gate is the only means of access to the site. The guardhouse gate is only used during times of construction when extensive traffic onto the site is experienced.

Contractors, consultants, visitors, and other non-employee personnel authorized to enter the facility are normally accompanied by facility personnel while on the premises. Exceptions occur where an individual has a prolonged or a very specific job to perform in a specific area of the facility (e.g., building construction, subsurface investigation). In these cases, facility personnel familiarize the person with the facility and safety emergency procedures to be followed while onsite through an extensive safety briefing. These individuals then sign a safety declaration. While at the facility, these individuals sign in daily so that their presence at the facility can be monitored. All personnel associated with the Phase I RFI attended the onsite safety briefing and signed in and out on a daily basis.

4.13 Borehole Abandonment Procedures

After sampling was completed, each HSA-drilled borehole was to be abandoned by pumping a bentonite slurry through the augers using the tremie pipe method. The WP specified the use of a bentonite slurry consisting of 94 pounds (lbs) of Portland Cement, 5 lbs of powdered bentonite, and 8.3 gallons of potable water. After thorough mixing, the slurry was to be emplaced through the augers until the entire borehole was filled. This abandonment procedure was only utilized on three HSA-drilled boreholes (S14:SL:GNA1, S14:SL:GNA2, and S14:SL:GND1).

Due to the competent nature of the surrounding soils and the depth of the boreholes, it was determined that boreholes could be effectively abandoned by pouring bentonite pellets into the completed borehole and hydrating them with potable water. This method was approved by the site manager, the USEPA, and the on-site OEPA representative. The use of this method was documented in an April 6, 1999 letter from Earth Tech to the USEPA. All boreholes (other than those described above) were abandoned using hydrated bentonite pellets.

In general, all boreholes that were created during soil-sampling activities were abandoned upon completion within a 12-hour time period. A survey stake marked with a unique identification number was placed in each abandoned borehole so the locations could be accurately surveyed.

5.0 RESULTS AND FINDINGS

This section of the report discusses the results and findings of the Phase I RFI, and presents data on exceedances of applicable standards within each studied area. The AOCs and SWMUs that were investigated are shown in Figure 4-1.

5.1 Standards for Comparison

All analytical data developed during this Phase I RFI were compared to recognized human health- or ecology-based standards to determine if the potential for contamination, and hence evaluation in the QRA, existed.

Earth Tech used background concentrations (metals only), USEPA Region 5 data quality levels (DQLs), USEPA Region 9 Industrial Preliminary Remedial Goals (PRGs), and USEPA Ecotox thresholds as the standards for comparison. As discussed in the QAPP, DQLs and PRGs are initial screening levels to which site contaminant concentrations can be compared, and are used to help focus the RFI on those areas and chemicals that are most likely to pose an unacceptable risk to human health and the environment. The risk assessment effort is then further refined based on this initial screening. These standards alone are not intended to serve as cleanup levels. For those parameters for which no PRG has been defined, the DQL served as an alternative standard.

Section 1.4.2 of the QAPP outlines the standards to be used for data comparison. Detection of any parameter above a standard, or a "non-detect" for which the standard is above the corresponding EPA Region 5 data quality level (DQL), will be considered as potential contamination for risk assessment. Applying this strategy to the Phase I RFI data resulted in the following comparison standards:

- Metals data from onsite soil samples were first compared to background concentrations to determine if the observed concentrations were due to natural conditions. Sample concentrations that were within the range of observed background concentrations were considered to represent uncontaminated conditions. This is discussed more fully in Section 5.2 below. Metals concentrations that exceeded background were then compared to the Region 9 Industrial PRGs. All other soil sample data (VOCs, SVOCs, etc.) were compared to the Region 9 Industrial PRGs.
- Metals data from the groundwater samples were compared to background groundwater concentrations. All other groundwater sample data were compared to USEPA Region 5 DQLs.
- Sediment sample data were compared to ecological toxicity (Ecotox) thresholds (USEPA, Office of Emergency and Remedial Response, January 1996). Based on a discussion with the USEPA, Region 5 Ecological DQLs (EDQLs) were also used as a standard for comparison. Ecotox thresholds were used as the initial screening standard, then the Region 5 EDQLs were used as a second screening standard. If Ecotox thresholds were not available for certain parameters, or if a sample result exceeded an Ecotox threshold, the data were compared to the Region 5 EDQLs.

The standards for comparison for the Phase I RFI are shown in Table 5-1. The data validation reports for the Phase I RFI analytical data are presented in Appendix I.

5.2 Background Soil Sampling

Background samples of soil were collected in areas of the property that had not been used for waste management purposes. This was done to determine the concentrations of metals in these soils for comparison to the Phase I RFI samples. Background soil samples were collected at the ground surface and a depth of 8 to 10 feet below ground surface (bgs) at the five locations presented in Figure 5-2.1a. Analytical results for these samples are presented in Figures 5.2.1a and 5.2.1b. These soil samples were collected via hollow-stem auger drilling, similar to the collection of grid node samples as described above. Background soil samples were analyzed for metals as described in Section 1.4.2 of the QAPP.

The analytical results for the background samples show that metals are naturally present in significant concentrations in facility soils, including arsenic, barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc. The range of variability in the background samples was evaluated by calculating the average and median concentrations for each target metal (Table 5-2). The number of background soil samples (5) limits the use of the average or median as statistically-based reference points, but they are valuable as a screening tool.

Metals results for the soil samples collected during the RFI were first compared to background concentrations, in accordance with Section 1.4.2 of the QAPP. If sample results were below the average background concentration, the sample was deemed to reflect background conditions, and that result was dropped from further consideration.

Metals concentrations that exceeded these background conditions (Appendix D) were then examined in two ways. First, the concentrations were compared to the EPA Region 9 PRGs to evaluate the magnitude of the exceedance. Second, the boring log for that sample was inspected to determine if the nature of the sampled material correlated with the exceedance (i.e., to verify that the correct material was sampled).

An exception to this procedure had to be made for arsenic results. The background data show that naturally-present concentrations of arsenic frequently exceed the corresponding Region 9 PRG that was used to evaluate the RFI data. The average of the arsenic results, 9.74 milligrams per kilogram (mg/kg), exceeds the arsenic PRG (2.99 mg/kg). Samples with arsenic results above the average background concentration were considered to reflect uncontaminated conditions if the result was within the range of observed background values and appeared to correspond to the results from neighboring samples. If these two conditions were satisfied, the result was dropped from further consideration.

5.3 Solid Waste Management Units

The results of soil sampling activities within each SWMU Group are presented in the following section. Since the sampling rationale for each unit varied somewhat depending on the nature of the unit and its history, a description of the sampling approach is also provided. All data collected will be used to support a quantitative risk assessment at the completion of the Phase II RFI. The SWMUs and AOCs at the site are summarized in Table 4-1, and are presented in Figures 1-4, 1-5, and 4-1.

As noted in Sections 4.3.2.1 and 4.3.2.2, the select location samples were collected directly from stabilized waste materials. Therefore, the presence of waste constituents is expected within these samples. This is particularly true in SWMU Groups A and C, where stabilized wastes are known to exist.

Analytical results from grid node samples provide evidence of whether a release from a SWMU has occurred. Significant constituent concentrations would not be expected in a grid node sample if the overlying SWMU did not release wastes to surrounding areas

Phase I RFI analytical data are presented in this report in three ways:

- within each SWMU Group or AOC (discussed below), exceedances are summarized in tables within the text, and on the corresponding figures
- a summary of all exceedances of applicable standards, plus analyte detections for which there is no standard, is provided in Appendix E
- a summary of all analytical results from the Phase I RFI sampling is provided in Appendix H

The data values presented in tables within the text include those values greater than the standards described in Section 5.1. If no standard exists for a compound, results are not included in the tables presented within the text. The data values presented on the figures include those values greater than the standards, as well as those values greater than zero if no standard exists.

In accordance with the approved Work Plan (WP) and QAPP, soil samples that were collected during investigation of the SWMUs were analyzed for the project target parameters (the Appendix IX list) as detailed above in Table 4-2. The geotechnical samples were analyzed for cation exchange capacity, Atterberg limits, moisture content, grain-size distribution (sieve and hydrometer), total organic carbon (TOC), and soil pH.

5.3.1 SWMU Group A

SWMU Group A consists of the following SWMUs:

- SWMU #1 - Surface Impoundment 1;
- SWMU #2 - Surface Impoundment 2;
- SWMU #3 - Surface Impoundment 3;
- SWMU #8 - Surface Impoundment 9 and Wet Well; and,
- SWMU #16 - Temporary Waste Pile Area.

These SWMUs are grouped together because they are included within the perimeter of SWMU #16. All of these units are closed surface impoundments that held wastes during their operation. The impoundments were all closed by fixing the waste and covering with clean clay fill. Later, the temporary waste pile was placed over this area during the construction of the TSCA closure cell. This area was excavated to the top of the original surface impoundments and covered with clean clay fill when the temporary waste pile was moved back into the TSCA closure cell.

Surface Impoundments 1, 2, 3, and 9 contained waste oils, oily sludges, inorganic acids and pickle liquors; the waste pile contained fixed sludges, structures, and soils. PCBs, D004-D011 metals, VOCs, PAHs, and phenols were identified as potential waste constituents in this SWMU Group. Based on site history and these potential constituents, samples were collected to characterize impact to the soil.

Sample Summary

A total of 58 soil samples were collected for this group, as presented below. Since stabilized waste was still emplaced in these SWMUs, soil samples were collected at 10 selected locations within the former boundaries of the surface impoundments, which were located using facility records. The objective of collecting these samples was to verify the presence of waste materials and evaluate the constituent contaminants. As noted above, the presence of waste constituents is expected within the select location samples. Additionally, soil samples were collected from 24 grid node locations on a systematic sampling grid based on 150-foot centers. These samples were collected to determine if waste constituents were released. Sample identification and collection procedures for these samples are discussed in the previous section (4.4). Figures 5-3.1a through 5-3.1h present the soil sampling locations and analytical results for SWMU Group A.

SWMU No.	Grid Node	Grid Node Geotechnical	Select	Select Geotechnical	QC
#1 – Surface Impoundment 1	2	1	2	2	-
#2 – Surface Impoundment 2	2	-	2	2	-
#3 – Surface Impoundment 3	2	1	2	2	1 FD
#8 – Surface Impoundment 9 and Wet Well	-	-	2	2	-
#16 – Temporary Waste Pile Area	18	-	2	2	2 MS/MSD 3 FD

MS/MSD = matrix spike/matrix spike duplicate
FD = field duplicate

Select Sample Discussion

Sampling results for the select locations (SL) in SWMU Group A are shown below; PRG exceedances for constituents other than arsenic are shown in bold. Two of the select sample locations in SWMU 16 were collected at locations used for grid node samples (B3 and B6). This was done because specific locations associated with former waste disposal could not be identified for this SWMU (the entire area was used for the temporary waste pile).

The select sampling results show that evidence of contamination did not extend beneath the base of the former surface impoundments (estimated at about 9 to 12 feet below grade). Because field observations indicated possible contamination at the base of SWMU #1 and SWMU #3, two additional samples were collected to delineate the vertical extent of contamination (S03:SL:SL01 in SWMU #3 and S01:SL:SL02 in SWMU #1). The results from these samples confirm that no PRGs (except for arsenic) were exceeded below the base of the former surface impoundments.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S01:SL:SL01-03	6-8	Benzo(a)pyrene	1,800 µg/kg	NA	360 µg/kg
S01:SL:SL02-05	10-12	Arsenic	10.7 mg/kg	9.74 mg/kg	2.99 mg/kg
		Dieldrin	200 mg/kg	NA	190µg/kg
S01:SL:SL02-08	16-18	Arsenic	10 mg/kg	9.74 mg/kg	2.99 mg/kg
S01:SL:SL02-09	18-20	Arsenic	20.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S02:SL:SL02-03	6-8	Arsenic	29.7 mg/kg	9.74 mg/kg	2.99 mg/kg
		Benzo(a)pyrene	1,300 µg/kg	NA	360 µg/kg
S03:SL:SL02-03	6-8	Arsenic	11.6 mg/kg	9.74 mg/kg	2.99 mg/kg
		1,1,1-Trichloroethane	18,000,000 µg/kg	NA	1,400,000 µg/kg
		Benzene	250,000 µg/kg	NA	250,000 µg/kg
		Chlorobenzene	530,000 µg/kg	NA	183,370 µg/kg
		Chloroform	16,000 µg/kg	NA	520 µg/kg
		Tetrachloroethene	10,000,000 µg/kg	NA	16,170 µg/kg
		Toluene	1,200,000 µg/kg	NA	520,000µg/kg
		Trichloroethene	820,000 µg/kg	NA	6,050 µg/kg
		Methylene chloride	94,000 µg/kg	NA	20,030 µg/kg
S16:SL:SL02-03	6-8	Dieldrin	200 µg/kg	NA	190 µg/kg

NA-not applicable for non-metal parameters

Grid Node Sample Discussion

The analytical results for the grid node samples are shown in the table below. Of the 26 grid node samples, only two parameters (except for arsenic) exceeded their respective standards for comparison.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S02:SL:GNB5-01	21-23	Arsenic	16.9 mg/kg	9.74 mg/kg	2.99 mg/kg
		Benzene	5,600 µg/kg		1,360µg/kg
S16:SL:GNB1-01	11-13	Arsenic	10.2 mg/kg	9.74 mg/kg	2.99 mg/kg
S16:SL:GNB6-01	14-16	1,1-Dichloroethene	220 µg/kg		120 µg/kg
S16:SL:GNB6-02	16-18	Arsenic	12.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S16:SL:GNC4-01	11-13	Arsenic	17.2 mg/kg	9.74 mg/kg	2.99 mg/kg
S16:SL:GND6-01	13-15	Arsenic	10.1 mg/kg	9.74 mg/kg	2.99 mg/kg

At grid node B5, the benzene PRG was exceeded; this sample was collected less than 2 feet below the observed bottom of former Surface Impoundment #2 based on soil type and a low PID reading. However, field notes indicate the possibility that contamination was "smeared" down the borehole by the augers due to saturated conditions at this depth. Therefore, it is not possible to conclude whether this exceedance represents an actual release.

At grid node B6, the PRG for 1,1-dichloroethene was slightly exceeded. However, a sample from the next 2-foot interval in this borehole did not exceed any PRGs (except for arsenic). Based on the presence of adjacent samples with low (3 ppm) PID readings above and below, this sample appears to be an isolated occurrence and may not represent a release.

Samples collected from this SWMU Group, as well as many other samples collected during the RFI, indicate the presence of arsenic. The arsenic concentrations observed across this SWMU Group are consistent with (i.e., are in the same range as) arsenic concentrations in the background samples (see Section 5.2). Grid node samples collected at a depth below that of the former surface impoundments in this SWMU Group display similar results. This strongly suggests that the arsenic is naturally present in site soils and is not indicative of impact from the site.

As discussed in Section 5.2, sample results with arsenic concentrations below the average background concentration are not shown in the summary tables in this section. Arsenic concentrations above average background are shown, but are interpreted as naturally-occurring if they are within the range of arsenic concentrations in the background samples. Exceptions are described in the text accompanying the data tables.

As can be seen from the grid node data from SWMU Group A, arsenic concentrations in five samples exceed the average background value, but all of the observed arsenic concentrations are within the background range (maximum 27.5 mg/kg). Therefore, these results are interpreted as natural conditions and not indicative of facility impact.

Two grid node locations (B6 and C5) required additional soil samples to delineate the vertical extent of contamination (samples S16:SL:GNB6-02 and S16:SL:GNC5-02, respectively). These samples were collected because field evidence (elevated PID readings) suggested that contamination might be present in these grid node locations, which were outside the stabilized waste in this SWMU Group. The analytical results for these samples indicate that no PRGs were exceeded, except for arsenic in the sample from B6.

As mentioned above, Appendix E presents a summary of all exceedances of the screening standards presented in Section 1.4.2 of the QAPP. These include published standards for PRGs, DQLs, Ecotox, and USEPA Region 5 Ecological DQLs (EDQLs). Appendix H presents a summary of all detections of Appendix IX compounds.

5.3.2 SWMU Group B

SWMU Group B consists of the following SWMUs:

- SWMU #4 - Surface Impoundment 4;
- SWMU #5 - Surface Impoundment 5;
- SWMU #7 - Surface Impoundment 7;
- SWMU #10 - Surface Impoundment 11;
- SWMU #11 - Surface Impoundment 12;
- SWMU #17 - Leachate Retention Pond; and,
- SWMU #53 - TSCA Closure Cell.

These SWMUs were grouped together due to their clean-closed status and proximity of the TSCA Closure Cell (SWMU #53), which was constructed over the location of former Surface Impoundments 4, 5, and 7. Surface Impoundments 4, 5, 7, 11, and 12 contained waste oils, oily sludges, waste acids, caustics, pickle liquors, and phenols. The Leachate Retention Pond (SWMU #17) contained surface water runoff from the waste pile. PCBs, D004-D011 metals, VOCs, PAHs, dioxins, and phenols are the

potential waste constituents that were identified as part of this SWMU Group. The location of SWMU Group B is presented on Figure 5-3.2a.

Surface Impoundments 4, 5, 7, 11, and 12 (SWMUs #4, #5, #7, #10, and #11) were certified clean-closed by the facility and approved by the OEPA. The letters of certification approval from the approving agency for each of these clean closures were provided in the WP. Results of soil sampling activities from these closures are provided in Appendix G. A description of the soil conditions around each of the closed units is also provided in the certification documents.

Based on historical records and the above potential constituents, a water sample was collected from the capillary drain that underlies the TSCA Closure Cell. Water from this drain is groundwater that has been in contact with surrounding soils, and this sampling approach provides a mechanism to assess these soils without disturbing the integrity of the closure cell. The capillary drain sample was analyzed as part of the Phase I RFI groundwater sampling activity, as described in Section 5.11 of the WP.

In addition, the Phase I RFI included a preliminary characterization of groundwater in the lacustrine sediments and bedrock downgradient of these land-based SWMUs and AOCs that still contain residual waste materials. This was done by validating analytical results from the four most-recent rounds of historical data (see Section 5.6), and collecting groundwater samples from the following onsite groundwater monitoring wells:

Well	Monitoring Location
L-17	Lacustrine sediments downgradient of SWMU Group A
L-19A	Lacustrine sediments downgradient of SWMU Group C
L-20	Lacustrine sediments downgradient of SWMU Group C
L-25	Lacustrine sediments downgradient of SWMU Group A
L-26	Lacustrine sediments upgradient of TSCA Closure Cell
MW-14R	Bedrock downgradient of SWMU Group A
MW-15R	Bedrock downgradient of SWMU Group A
MW-20R	Bedrock downgradient of SWMU Group C
MW-22R	Bedrock downgradient of SWMU Group C
MW-24R	Bedrock upgradient of facility

The locations and analytical results for these wells are shown in Figures 5-3.2b through 5-3.2d. Groundwater samples were collected using the sampling procedures described in the facility's approved Ground Water Monitoring (GWM) Plan. The order of sampling was the same as described in the GWM Plan. Based on past groundwater sampling activities, both total and dissolved metals were collected and analyzed due to the background groundwater quality in the vicinity of the facility.

The groundwater sampling results are shown below. This table presents all detections, in contrast to other tables within this section, to illustrate the quality of the downgradient samples as compared to two wells upgradient of the Closure Cell (L-26 and MW-24R). Exceedances of Region 5 DQLs for groundwater, which are the applicable standards in accordance with the WP, are shown in bold.

Monitoring Well	Parameter	Result (total)	Result (filtered)	Region 5 DQL
Capillary Drain	Cyanide, total	19.4 µg/L		6.2 µg/L
L-17	(no detections)			
L-19A	Cyanide, total	6.8 µg/L		6.2 µg/L
L-20	n-Nitrosomorpholine	4 µg/L		-
L-25	(no detections)			
L-26*	Bis(2-ethylhexyl)phthalate	2 µg/L	-	4.8 µg/L
	Di-n-butylphthalate	2 µg/L	-	3,700 µg/L
	Benzene	1 µg/L	-	0.39 µg/L
	Chlorobenzene	1 µg/L	-	39 µg/L
	1,1-Dichloroethane	6 µg/L	-	0.12 µg/L
	1,2-Dichloroethane	21 µg/L	-	0.046 µg/L
	1,4-Dioxane	177 µg/L	-	1 µg/L
	Arsenic	3.8 µg/L	ND	0.038 µg/L
	Barium	59.6 µg/L	46.2 µg/L	2,600 µg/L
	Cadmium	1.6 µg/L	0.95 µg/L	18 µg/L
	Chromium	157 µg/L	1.8 µg/L	180 µg/L
	Cobalt	6.6 µg/L	5.3 µg/L	-
	Lead	11.3 µg/L	2 µg/L	4 µg/L
	Mercury	0.25 µg/L	ND	11 µg/L
	Nickel	89.9 µg/L	81.5 µg/L	730 µg/L
	Selenium	2.4 µg/L	ND	180 µg/L
	Silver	1.9 µg/L	1.9 µg/L	180 µg/L
	Vanadium	4.8 µg/L	ND	260 µg/L
	Zinc	12.1 µg/L	ND	11,000 µg/L
MW-14R	Bis(2-ethylhexyl)phthalate	15 µg/L		4.8 µg/L
	Cyanide, total	7.4 µg/L		6.2 µg/L
MW-15R	(no detections)			
MW-20R	(no detections)			
MW-22R	(no detections)			
MW-24R**	Bis(2-ethylhexyl)phthalate	2 µg/L		4.8 µg/L
	Di-n-butylphthalate	12 µg/L		3,700 µg/L
	Antimony	0.88 µg/L		180 µg/L
	Chromium	1.1 µg/L		180 µg/L
	Silver	3.5 µg/L		15 µg/L

* - L-26 is upgradient of the TSCA Closure Cell

** - MW-24R is upgradient of the entire facility

ND = not detected; - = no standard

The sampling results do not indicate a significant impact from the facility in the sampled downgradient wells. Using MW-24R as a comparison point, the results show minor exceedances of cyanide in three samples, and bis(2-ethylhexyl)phthalate in one well. However, these are not related to the waste parameters in this SWMU group. The results show evidence of impact in L-26, one of the wells upgradient of the TSCA Closure Cell. This may be due to facility activities in the area.

5.3.3 SWMU Group C

SWMU Group C consists of the following SWMUs:

- SWMU #6 - Surface Impoundments 6E and 6W;
- SWMU #9 - Surface Impoundment 10; and,
- SWMU #19 - Former Drum Storage Area.

These SWMUs are grouped together because of their location and overlapping of the units. The former surface impoundments identified in this grouping were at one time associated with each other as identified in the facility's operational record. SWMU #19, the former drum storage area, is located above or adjacent to the surface impoundments in the area and therefore has been included in this grouping.

Surface Impoundment #6 contained waste acids, acid sludges, pickle liquors, phenol wastes, and sludges from Surface Impoundment #9. Surface Impoundment #10 contained aqueous sludges and phenol wastes. The impoundments were used to hold waste during their operation, and were closed by fixing the waste and covering with clean clay fill. After closure, the former drum storage area was placed above these two surface impoundments; however, the history of the drum storage area is uncertain. PCBs, pesticides, D004-D011 metals, VOCs, PAHs, and phenols are the potential waste constituents that have been identified as part of this SWMU Group. Based on historical records and the above potential constituents, samples were collected to characterize potential impact to the soil.

Sample Summary

A total of 32 soil samples were collected and submitted to the laboratory from SWMU Group C, as shown below. Since stabilized waste was still emplaced in these SWMUs, soil samples were collected at 6 selected locations within the former boundaries of the surface impoundments, which were located using facility records. An additional sample was collected from a selected location at the former drum storage area. The objective of collecting these samples was to verify the presence of waste materials and evaluate the constituent contaminants. As noted above, the presence of waste constituents is expected within the select location samples.

Soil samples were also collected from 18 locations based on a systematic sampling grid with 100-foot centers. Three of the grid node locations originally proposed in the WP were relocated during the field investigation because they were found to be within the TSCA Closure Cell cap. These locations (SWMU #6, grid nodes B1, C1, and D1) were moved approximately 12 to 15 feet south of their originally-proposed locations. These samples were collected to determine if waste constituents were released.

SWMU No.	Grid Node	Grid Node Geotechnical	Select	Select Geotechnical	QC
#6-Surface Impoundment 6E, 6W	4	-	2	-	-
#9- Surface Impoundment 10	12	2	4	-	1 MS/MSD 2 FD
#19- Former Drum Storage Area	2	1	1	-	1 FD

MS/MSD = matrix spike/matrix spike duplicate
FD = field duplicate

Select Sample Discussion

The analytical results for the samples collected from the select locations (shown below) indicate three exceedances of PRGs, except for arsenic. None of the samples contain arsenic above the average background concentration. Several of the detected parameters appear to be related to the wastes that were stored in these former surface impoundments. The soil sampling locations and analytical results for SWMU Group C are presented in Figures 5-3.3a through 5-3.3h.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S06:SL:SL01-04	6-8	Benzene Chromium	29,124 µg/kg 237 mg/kg	NA 28.34 mg/kg	1,360 µg/kg 64.05 mg/kg
S09:SL:SL01-05	8-10	Benzene Chromium	21,551 µg/kg 2,950 mg/kg	NA 28.34 mg/kg	1,360 µg/kg 64.05 mg/kg
S09:SL:SL02-10	18-20	Lead Benzene Chromium	1,730 mg/kg 43,287 µg/kg 300 mg/kg	NA NA 28.34 mg/kg	1,000 mg/kg 1,360 µg/kg 64.05 mg/kg

NA- not applicable for non-metal parameters

At all of these locations, field observations indicated that evidence of contamination did not extend beneath the base of the former surface impoundments, estimated to be about 13 feet (SWMU #6) and 20 feet (SWMU #9) below grade. At the select location that was sampled to determine the vertical extent of contamination (sample S09:SL:SL02-11), the results show that PRGs were not exceeded below the base of the former surface impoundment.

Grid Node Sample Discussion

None of the results for the grid node samples (shown below) exceeded applicable standards, except for arsenic. The background value for arsenic was exceeded in six samples. As with SWMU Group A, however, the arsenic concentrations are consistent with the range of arsenic concentrations in the background samples. Therefore, these results are interpreted as representing natural conditions and not indicative of facility impact. Several of the other metals concentrations in these samples exceeded background, but did not exceed their respective PRGs. This shows that the SWMUs have not released waste constituents. A table showing exceedances of background is provided in Appendix D.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S09:SL:GNA2-01	11-13	Arsenic	15.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S09:SL:GNC2-01	11-13	Arsenic	12.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S09:SL:GNC3-01	13-15	Arsenic	10.4 mg/kg	9.74 mg/kg	2.99 mg/kg
S09:SL:GNF2-01	11-13	Arsenic	26.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S19:SL:GNE1-01	14-16	Arsenic	12.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S19:SL:GNF1-01	11-13	Arsenic	12.9 mg/kg	9.74 mg/kg	2.99 mg/kg

5.3.4 SWMU Group D

SWMU Group D consists of the following SWMUs:

- SWMU #12 - North Landfarm;
- SWMU #13 - East Landfarm; and
- SWMU #14 - South Landfarm.

These SWMUs were grouped together because of their similar use during operation. The facility's operational record documents that several feet of clay were placed over these excavated areas, and the areas were then graded to promote surface water runoff.

The North, East, and South Landfarms contained oily and plating sludges. In addition, the waste history of these landfarms indicated that metal hydroxide sludges were present at the North and East Landfarms, but absent at the South Landfarm. PCBs, D004-D011 metals, VOCs, PAHs, and phenols are the potential waste constituents that have been identified as part of this SWMU Group. Based on historical records and the above potential constituents, samples were collected to confirm the removal of residual wastes.

Sample Summary

The landfarms received sludges from the surface impoundments. These areas were closed by removing soils, backfilling with clean soils from an offsite source, and capping each area with clay. To confirm the removal of residual wastes in these areas, 38 soil samples were collected from 33 locations based on a systematic sampling grid with 100-foot centers. The sample locations and analytical results are presented on Figures 5-3.4a through 5-3.4i. Samples were collected as follows:

SWMU No.	Grid Node	Grid Node Geotechnical	Select	Select Geotechnical	QC
#12-North Landfarm	16	2	-	-	2 FD
#13- East Landfarm	12	1	-	-	1 MS/MSD 1 FD 1 FD (geo)
#14- South Landfarm	10	1	-	-	1 FD

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

Select Sample Discussion

In accordance with the WP, no "select location" samples were collected within this SWMU Group because the potential for impact was expected to be measurable within the upper 5 feet of soil. The deeper samples that were collected (SWMU #12, location F2 and SWMU #14, locations A1, A2, and D1) did not indicate the presence of waste-related contaminants.

Grid Node Sample Discussion

The grid node samples were collected in a similar manner as outlined above, at a depth of approximately 2.5 to 4.5 feet. This sampling depth was based on the approximate depth of mixing used during the operation of the landfarming units.

None of the results for the grid node samples exceeded applicable standards, except for arsenic and benzo(a)pyrene. The results that exceeded average background concentrations are shown below. As can be seen from these results, the arsenic concentrations are within the range of the background samples (maximum 27.5 mg/kg). Two of the arsenic samples that exceeded the average background were collected from relatively deep intervals (8.5 to 10.5 feet and 18.5 to 20.5 feet). These sample depths, and

the high clay content of these soils, provide further indication that the presence of arsenic at these concentrations is natural and is not due to impact from former site activities.

The PRG for benzo(a)pyrene was exceeded in only one sample. This compound is related to the waste materials formerly managed in this area, but is also commonly found in asphaltic materials. The single exceedance, from a shallow sample, indicates that there is no widespread impact from these SWMUs. The benzo(a)pyrene detection could also be due to inclusion of foreign material in the sample.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S12:SL:GNA2-01	4.5-6.5	Arsenic	10 mg/kg	9.74 mg/kg	2.99 mg/kg
S12:SL:GNB2-01	4.5-6.5	Arsenic	11.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S12:SL:GNF2-01	2.5-4.5	Benzo(a)pyrene	760 µg/kg	NA	360 µg/kg
S12:SL:GNF2-03	8.5-10.5	Arsenic	16.3	9.74 mg/kg	2.99 mg/kg
S12:SL:GNF3-01	2.5-4.5	Arsenic	16.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNA3-01	2.5-4.5	Arsenic	21.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNA4-01	2.5-4.5	Arsenic	16 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNB1-01	2.5-4.5	Arsenic	9.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNB2-01	2.5-4.5	Arsenic	10.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNB3-01	2.5-4.5	Arsenic	15.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNB4-01	2.5-4.5	Arsenic	14.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNC3-01	2.5-4.5	Arsenic	10.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S13:SL:GNC4-01	2.5-4.5	Arsenic	12.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S14:SL:GNA2-01	2.5-4.5	Arsenic	12.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S14:SL:GNA2-02	18.5-20.5	Arsenic	12.5 mg/kg	9.74 mg/kg	2.99 mg/kg

NA- not applicable for non-metal parameters

5.3.5 SWMU Group E

SWMU Group E consists of the following SWMUs:

- SWMU #50 - Injection Well 1A;
- SWMU #51 - Injection Well 1; and
- SWMU #52 - Injection Well 3.

These SWMUs were grouped together due to their similar usage during operation. These units were all decommissioned. Acids, D004-D011 metals, and VOCs are the potential waste constituents that have been identified as part of this SWMU Group. Based on historical records and the above potential constituents, samples were collected to determine whether contamination exists in surficial soils around these SWMUs.

Sample Summary

One surface soil sample was collected around each of these SWMUs in the approximate area where the SWMU was located (Figures 5-3.5a through 5-3.5d). The sampling objective for this SWMU Group was to determine if there was any indication of surface spills from past operation of these SWMUs. The soil was collected using the surface sampling procedures described in Section 4.3.3.

SWMU No.	Grid Node	Grid Node Geotechnical	Surface Sample	Geotechnical	QC
#50-Injection Well 1A	-	-	1	-	-
#51- Injection Well 1	-	-	1	1	1 MS/MSD
#52- Injection Well 3	-	-	1	-	-

MS/MSD = matrix spike/matrix spike duplicate
FD = field duplicate

Sampling Discussion

There were no exceedances of PRGs, except for arsenic, in this SWMU Group. The sample data show arsenic concentrations that are within the range of the background samples. Therefore, these results are interpreted as representing natural conditions and are not indicative of facility impact.

5.3.6 SWMU Group F

SWMU Group F consists of following SWMUs:

- SWMU #31 - Filtered Acid Tank (FAT) 3;
- SWMU #32 – Pump House 3;
- SWMU #33 - FAT 6;
- SWMU #34 – Pump House 6;
- SWMU #35 - FAT 5;
- SWMU #36 – Pump House 5;
- SWMU #37 - FAT 4;
- SWMU #38 – Pump House 4;
- SWMU #39 - Old FAT 2; and,
- SWMU #40 - Former Pump House 2.

The filtered acid tanks and pump houses contain filtered acidic wastes. Acids, D004-D011 metals, phenols, and VOCs are the potential waste constituents that have been identified as part of this SWMU Group. Based on historical records and the above potential constituents, soil samples were collected at selected locations to determine whether contamination exists in the surficial soils.

These SWMUs were grouped together due to their similarity of use during operation. Presently, all of the FATs are double-walled tanks. The secondary containment system, constructed of reinforced concrete, remains in place as an additional measure of protection. These secondary containment systems were installed in the mid-1980s. There are reports in the historical record of some spills around FAT 3 in which approximately 2,000 gallons of acid were released due to mechanical failure. The areas around these spills were immediately remediated upon knowledge of their occurrence.

Sample Summary

To determine if impact from these facilities is present, soil samples were collected around each of the SWMUs, biased to locations where contamination may have existed. Twenty-five surface soil samples

were collected at 10 locations (Figure 5-3.6a through 5-3.6f), using the procedures described in Section 4.3.3.

SWMU No.	Grid Node	Grid Node Geotechnical	Surface Sample	Geotechnical	QC
#31- FAT 3	-	-	2	-	-
#32- Pump House 3	-	-	2	1	-
#33- FAT 6	-	-	2	-	-
#34- Pump House 6	-	-	2	-	1 FD
#35- FAT 5	-	-	2	-	-
#36- Pump House 5	-	-	2	-	-
#37- FAT 4	-	-	2	-	-
#38- Pump House 4	-	-	2	1	-
#39- Old FAT 2	-	-	2	-	1 MS/MSD
#40- Former Pump House 2	-	-	2	-	1 FD

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

Sampling Discussion

None of the applicable standards were exceeded by these samples, except for arsenic and one sample for chromium. As with SWMU Group A, the arsenic concentrations are consistent with those observed in the background samples. Therefore, the arsenic results are interpreted as the result of natural conditions and not indicative of facility impact.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S31:SL:SF01-01	0-2	Arsenic	11.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S31:SL:SF02-01	0-2	Arsenic	10.1 mg/kg	9.74 mg/kg	2.99 mg/kg
S32:SL:SF02-01	0-2	Arsenic	11.2 mg/kg	9.74 mg/kg	2.99 mg/kg
S33:SL:SF02-01	0-2	Arsenic	11.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S34:SL:SF01-01	0-2	Arsenic	21.9 mg/kg	9.74 mg/kg	2.99 mg/kg
S34:SL:SF01-01-FD	0-2	Arsenic	10.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S34:SL:SF02-01	0-2	Arsenic	9.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S35:SL:SF-02-01	0-2	Arsenic	10.4 mg/kg	9.74 mg/kg	2.99 mg/kg
S37:SL:SF01-01	0-2	Arsenic	10.6 mg/kg	9.74 mg/kg	2.99 mg/kg
S38:SL:SF02-01	0-2	Arsenic	10.6 mg/kg	9.74 mg/kg	2.99 mg/kg
S39:SL:SF01-01	0-2	Arsenic	10.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S40:SL:SF02-01-FD	0-2	Chromium	123 mg/kg	28.34 mg/kg	64.05 mg/kg

The chromium detection is in a duplicate sample (indicated by "FD") and was not confirmed in the original sample (S40:SL:SF02-01). The concentration of chromium in the original sample (25.7 mg/kg) does not exceed the PRG; hence, it is not listed in Appendix E.

5.3.7 SWMU Group G

SWMU Group G consists of the following SWMUs:

- SWMU #21 - Truck Unloading Building;
- SWMU #22 - Sand Interceptors;
- SWMU #23 - V-Tanks;
- SWMU #24 - Caustic Gas Scrubber;
- SWMU #25 - T-Tanks;
- SWMU #26 - T-Tank Pump House;
- SWMU #27 - Leaf Filter Press Building;
- SWMU #29 - Plate Filter Press Building; and,
- SWMU #30 - FAT A and B.

These SWMUs were grouped together based on their active status within the facility's treatment process, and are used to handle pickle liquors, acids, and brines. Acids, D004-D011 metals, and VOCs are the potential waste constituents that have been identified within this SWMU Group. Based on the historical record and the above potential constituents, samples were collected at selected locations to characterize potential impacts to soil. Small-quantity releases from some of these SWMUs have been documented in the facility's operational record. Upon discovery, the spills were remediated.

Sampling Summary

Soil samples were collected in areas around the SWMUs that were biased towards spill potential, as summarized below.

SWMU No.	Select Sample	Surface Sample	Geotechnical Sample	QC
#21- Truck Unloading Building		No sampling required		
#22- Sand Interceptors		No sampling required		
#23- V-Tanks	4	-	-	-
#24- Caustic Gas Scrubber		No sampling required		
#25- T-Tanks		No sampling required		
#26- T-Tank Pump House		No sampling required		
#27- Leaf Filter Press Building	3	-	1	-
#29- Plate Filter Press Building	4	-	1	-
#30- FAT A and B	3	-	-	1 FD 1 MS/MSD

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

Figures 5-3.7a through 5-3.7e present the soil sampling locations and analytical results for SWMU Group G. Soil sampling activities at each of these SWMUs are described below:

SWMU #21 - Truck Unloading Building

No releases have ever been reported from this unit, and spill-resistant liners are used in each sump within the building. The concrete floors are sloped to these 18-inch deep sumps. In accordance with the approved WP, no sampling was conducted at this SWMU.

SWMU #22 - Sand Interceptors (Grit Filters)

The grit filters were contained in concrete chambers that served as secondary containment for these units. No releases to the soil or groundwater are documented. In accordance with the approved WP, no sampling was conducted at this SWMU.

SWMU #23 - V-Tanks

Four soil samples were collected in locations near the transfer lines leading to the V-Tank facility, where potential leakage could have occurred. These samples were collected just below the depth of the concrete vault, which is approximately 13 feet below ground surface. Prior to sampling, boreholes were advanced to a depth of 10 feet; then, split-spoon samples were obtained from the 12- to 14-foot interval. The results of this sampling are summarized at the end of this section.

SWMU #24 - Caustic Gas Scrubber

Air releases from the scrubber have been documented in the facility record. However, changes in the management of certain waste streams have been implemented to prevent further releases from occurring. In accordance with the approved WP, no sampling was conducted at this SWMU.

SWMU #25 - T-Tanks

This unit was constructed in 1989 with secondary containment. No releases have been associated with this unit. In accordance with the approved WP, no sampling was conducted at this SWMU.

SWMU #26 - T-Tank Pump House

This unit was constructed in 1989 and all pumps are housed within a building on a bermed concrete pad. No releases have been associated with this unit. In accordance with the approved WP, no sampling was conducted at this SWMU.

SWMU # 27 - Leaf Filter Press Building

Surface soil sampling was conducted in areas with potential contamination. Three surface soil samples and 1 geotechnical sample were collected around the building according to the procedures described in Section 4.3.3. The results of this sampling are presented below.

SWMU # 29 - Plate Filter Press Building

Surface soil sampling was conducted in areas near the former underground pipes that led to the sluice pit. All soils associated with these pipes were reportedly removed; however, soil samples were collected to verify these previous Interim Corrective Measures activities. Four surface soil samples and one geotechnical sample were collected around the building. The results of this sampling are presented below.

SWMU # 30 - FAT A & B

Surface soil samples were collected in areas with a potential for contamination and outside the containment berm. Three surface soil samples were collected, one at each accessible direction around the containment. One field duplicate sample and one matrix/matrix spike duplicate sample were also collected from this SWMU.

As can be seen from the data shown below, the arsenic concentrations observed in the soil are within the background range (maximum 27.5 mg/kg). Therefore, these results are interpreted as natural conditions and not indicative of facility impact.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S23:SL:SL04-02	12-14	Arsenic	18.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S29:SL:SF01-01	0-2	Arsenic	10.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S30:SL:SF01-01	0-2	Arsenic	11.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S30:SL:SF02-01	0-2	Arsenic	18.3 mg/kg	9.74 mg/kg	2.99 mg/kg

The sampling results for SWMU Group G indicate no exceedances of other applicable standards. The average background concentrations of some target metals were exceeded in several samples (see Appendix D), but none of these samples exceeded a corresponding PRG. This indicates that there have been no releases requiring further consideration.

5.3.8 SWMU Group H

SWMU Group H consists of the following SWMUs:

- SWMU #46 - Injection Well 2;
- SWMU #47 - Injection Well 4;
- SWMU #48 - Injection Well 5; and,
- SWMU #49 - Injection Well 6.

Sample Summary

The injection wells comprised by this SWMU group are used to inject filtered acid wastes and brines into the Mt. Simon Sandstone at depths greater than 2,000 feet below ground surface. Acids, D004-D011

metals, and VOCs are the potential waste constituents that have been identified as part of this SWMU Group. Based on the historical record and the above potential constituents, samples were collected at selected locations to characterize potential impacts to soil. A summary of the soil samples collected within this SWMU Group is provided below.

SWMU No.	Surface Sample	Vertical Extent	Geotechnical Sample	QC
#46- Injection Well 2	1	-	-	-
#47- Injection Well 4	1	1	-	-
#48- Injection Well 5	1	-	-	-
#49- Injection Well 6	1	-	1	1 FD

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

Surface soil samples were collected around each injection well to determine whether spills have affected surface soils around these SWMUs. Figures 5-3.8a through 5-3.8e present the soil sampling locations and analytical results for SWMU Group H.

Sampling Discussion

The analytical results for these samples indicate that none of the applicable standards were exceeded, except for arsenic in most of the samples. However, only one sample (presented below) exceeded the average background concentration. The arsenic results for two of the samples from SWMU #49 had detection limits above the PRG, so no exceedance determination could be made. As with SWMU Group A, however, the arsenic concentrations are consistent with arsenic concentrations in the background samples. Therefore, these results are interpreted as the result of natural conditions and not indicative of facility impact.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S46:SL:SF01-01	0-2	Arsenic	10.7 mg/kg	9.74 mg/kg	2.99 mg/kg

The analytical results also show that the concentrations of some target metals exceeded the average background in several samples (see Appendix D), but none of these detections exceeded the corresponding PRGs. This indicates that there have been no releases from these units that require further consideration.

5.3.9 SWMU Group I

SWMU Group I consists of the following SWMUs:

- SWMU #15 - Oil Recovery Area;
- SWMU #18 - Former W-Tanks;
- SWMU #20 - Lab Waste Tank;
- SWMU #28 - Sluice Pit;
- SWMU #41 - PCB Storage Area;
- SWMU #42 - Maintenance Waste Oil Tank (Closed);
- SWMU #43 - Sanitary Wastewater Treatment Facility;
- SWMU #44 - Truck Unloading Facility Sewage Holding Tank; and,
- SWMU #45 - Maintenance Building Sewage Holding Tank.

Sample Summary

These SWMUs, although grouped together, are considered to be independent of each other. Therefore, the following paragraphs describe the individual sampling and analytical procedures that were used for each unit. The locations of these SWMUs are presented on Figure 5-3.9a. Sampling activities for these SWMUs are summarized below.

SWMU No.	Grid Node Sample	Select Sample	Surface Sample	Geotechnical	Geotech Duplicate	QC
#15- Oil Recovery Area	12	-	-	2	1	1 FD 1MS/MSD
#18- Former W-Tanks	No sampling required					
#20- Lab Waste Tank	-	1	-	-	-	-
#28- Sluice Pit	No sampling required					
#41- PCB Storage Area	-	-	3	-	-	1 FD 1MS/MSD
#42- Maintenance Waste Oil Tank	-	2	-	1	-	1 FD 1MS/MSD
#43- Sanitary Wastewater Treatment Facility	-	3	-	1	-	-
#44- Truck Unloading Facility Sewage Holding Tank	-	3	-	-	-	-
#45- Maintenance Building Sewage Holding Tank	-	1	-	-	-	-

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

SWMU #15 - Oil Recovery Area

The oil recovery area was used to recover oil-bearing wastewater and light oil sludges that were mixed and sent to an oil/water separator. The recovered oil was stored in tanks, and the wastewater was transferred to a pretreatment system prior to disposal in the injection wells. This facility was decommissioned in 1985. Cyanide, PCBs, D004-D011 metals, PAHs, and VOCs are the potential waste constituents that have been identified as part of this SWMU. During the decommissioning process, the contents of the oil recovery area were either placed in the temporary waste pile or sent offsite for disposal.

PCBs were discovered throughout the oil recovery area during remediation, and contaminated soils were removed. Following this remediation, soil sampling determined that no other contamination existed in this area.

Twelve grid node samples, two geotechnical samples, one geotechnical duplicate sample, one field duplicate sample, and one matrix/matrix spike duplicate sample were collected at 12 locations within the area of this SWMU, using a systematic grid based on 100-foot centers. The soil sampling locations and analytical results for SWMU #15 are presented in Figure 5-3.9b through 5-3.9d.

The purpose of the sampling was to confirm these remediation activities. Migration of contaminants below a depth of two feet was not expected, due to the high clay content of the lacustrine soils in this area. Surface soil samples were collected as outlined above (Section 4.3.3) from a depth of 2 to 4 feet bgs. The samples were analyzed for Appendix IX parameters; if PCBs were detected, the soil samples were also to be analyzed for dioxins and furans in accordance with the WP. Only one sample (S15:SL:GNA3-01) contained detectable PCBs (14 µg/kg of Aroclor 1260). This sample was not analyzed for dioxins and furans because the holding time for dioxin analysis had expired by the time the PCB results were reported from the laboratory.

As can be seen from the sampling results (presented below), arsenic concentrations observed in the soil are within the background range. Therefore, these results are interpreted as natural conditions and not indicative of facility impact. One sample exceeded the PRG for chromium, but this parameter is not related to the wastes managed at this location. Therefore, this exceedance will not be considered further.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S15:SL:GNA1-01	2-4	Arsenic	10.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNA2-01	2-4	Arsenic	15.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNA3-01	2-4	Arsenic	13 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNB2-01	2-4	Arsenic	12 mg/kg	9.74 mg/kg	2.99 mg/kg
		Chromium	98.8 mg/kg	28.34 mg/kg	64.05 mg/kg
S15:SL:GNB3-02	2-4	Arsenic	17 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNB4-01	2-4	Arsenic	16 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNC1-01	2-4	Arsenic	13.8 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNC3-01	2-4	Arsenic	13.5 mg/kg	9.74 mg/kg	2.99 mg/kg
S15:SL:GNC4-01	2-4	Arsenic	14.7 mg/kg	9.74 mg/kg	2.99 mg/kg

These results show that the remediation conducted in this area was sufficient, as no PCB or SVOC exceedances were noted.

SWMU #18 - Former W-Tanks [Clean Closed]

The Former W-Tanks were clean-closed in 1992. Prior to that they had been used to store aqueous wastes, oily wastes, odorous wastes, and phenolic waste prior to treatment. During the clean closure of the unit, samples were collected to characterize the soils. These sample data are included in Appendix G. No additional sampling was conducted at this SWMU.

SWMU #20 - Lab Waste Tank

The lab waste tank is an active 2,500-gallon capacity polyethylene underground storage tank (UST) that receives lab wastes and unused portions of samples taken from tanker trucks. The contents of the tank are regularly pumped out and disposed via deep well injection. This tank sits in a lined concrete vault measuring 9 feet wide by 9 feet long by 9 feet deep. The concrete is 8 inches thick along the walls and the base. PCBs, PAHs, D004-D001 metals, phenols, and VOCs are the potential waste constituents that have been identified as part of this SWMU. Based on the historical record and the above potential constituents, a sample was collected to determine whether there has been a release to the soils.

One soil sample was collected just below the base of the concrete vault to determine whether there have been releases from the tank. This sample was collected at a depth of 9 to 11 feet bgs within the lacustrine soils, in the downgradient direction of groundwater flow (Figure 5-3.9e). It was not necessary to modify the sampling location as was proposed in the WP. Prior to sampling, a borehole was advanced to a depth of 7 feet. Then, two split-spoon samples were collected at 7 to 9 feet bgs and 9 to 11 feet bgs. The deeper (9 to 11 feet bgs) sample was forwarded to the laboratory for analysis.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S20:SL:SL01-02	9-11	Silver	0.2 mg/kg	0.2 mg/kg	9,365.75 mg/kg

These results indicate that there has been no apparent impact from the lab waste tank; the metals concentrations that were detected are well within the range of background values observed in surrounding samples.

SWMU #28 - Sluice Pit [Clean Closed]

The Sluice Pit was clean-closed in 1996. This unit held acidic rinse water derived from the backflushing of the leaf filters. During the clean closure of the unit, samples were collected to characterize the soils. Soils data from the clean closure are included in this Phase I RFI report (Appendix G). No samples were collected at this SWMU.

SWMU #41 - PCB Storage Area

The drum storage pad is housed in a building in which drums of laboratory-generated PCB wastes were stored. This area is no longer active. Various acids, D004-D011 metals, phenols, and VOCs are the potential waste constituents that have been identified as part of this SWMU. Based on the historical record and the above potential constituents, samples were collected to characterize the impact to the surface soils.

Three surface soil samples were collected within the SWMU in the direction of surface water run-off. In addition, one field duplicate sample, one matrix/matrix spike duplicate sample and one geotechnical sample were collected within SWMU 41. The soil sampling locations and analytical results for SWMU #41 are presented in Figure 5-3.9f, and the exceedances observed in these samples are shown below.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S41:SL:SF01-01	0-2	Arsenic	10.7 mg/kg	9.74 mg/kg	2.99 mg/kg
S41:SL:SF02-01	0-2	Arsenic	10.3 mg/kg	9.74 mg/kg	2.99 mg/kg
		Benzo(a)pyrene	1,300 µg/kg	NA	360 µg/kg

NA- not applicable for non-metal parameters

None of the potential waste constituents were observed exceeding applicable standards, except for arsenic and benzo(a)pyrene. As with SWMU Group A, however, the arsenic concentrations are interpreted as naturally-occurring and not indicative of facility impact. The benzo(a)pyrene detection was confirmed in the duplicate sample, but does not indicate significant impact at this concentration.

SWMU #42 - Maintenance Waste Oil Tank (Closed)

The waste oil tank formerly located at the maintenance facility has been closed and removed. While in service, this underground storage tank received waste lubricating oil derived from the onsite machinery. VOCs, SVOCs, and TPH are the potential waste constituents that have been identified as part of this SWMU.

Two soil samples were collected from this location to determine whether residual contamination remains in this area. This SWMU was removed in 1992; however, no documentation exists on the characterization of soil beneath the tank. Therefore, one soil sample was collected at the lowest surface elevation in the area of the former tank, and another soil sample was collected at a depth of 2 to 4 feet bgs. The soil sampling locations and analytical results for SWMU #42 are presented in Figure 5-3.9g. Additionally, one matrix/matrix spike duplicate sample, one field duplicate sample, and one geotechnical sample were collected. Both soil samples collected within this SWMU were analyzed for VOCs, SVOCs, PCBs, and metals.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S42:SL:SL01-01	2-4	Chromium	90 mg/kg	28.34 mg/kg	64.05 mg/kg
S42:SL:SL01-02	6-8	Arsenic	25.9 mg/kg	9.74 mg/kg	2.99 mg/kg

None of the potential waste constituents were detected above applicable standards. Arsenic and chromium exceeded their corresponding PRGs, but these parameters are not related to the wastes managed at this area. Therefore, these results are interpreted as indicating that no residual contamination is present.

SWMU #43 - Sanitary Wastewater Treatment Facility

The sanitary wastewater treatment facility collects septic wastes from the administration building and operations lunchroom, and wastes that are pumped out of the sewage holding tanks located at the maintenance building and the truck unloading facility. Septic waste is the constituent that has been identified as part of this SWMU. Based on the historical record and the above potential constituents, samples were collected to characterize the impact to the surface soils.

Two soil samples were collected beneath the base of the two series of vaults, at 6 to 8 feet bgs. These samples were collected in the lacustrine soils, in the downgradient direction of groundwater flow (Figure 5-3.9h). Another sample to characterize the vertical extent of contamination was also collected 8 to 10 feet bgs at the first selected location. One geotechnical sample was collected at SWMU #43. The soil samples collected within this SWMU were analyzed for VOCs, SVOCs, metals, and chloride. The chloride was selected as an indicator analyte to determine whether the sanitary wastewater treatment facility leaked.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S43:SL:SL01-05	8-10	Arsenic	14.3 mg/kg	9.74 mg/kg	2.99 mg/kg
S43:SL:SL02-04	6-8	Arsenic	18.8 mg/kg	9.74 mg/kg	2.99 mg/kg

No chloride detections were observed above the PRG, and no other constituent except for arsenic exceeded applicable standards. The arsenic concentrations are interpreted as naturally-occurring. Therefore, there is no evidence of impact from this facility.

SWMU #44 and 45 - Truck Unloading Facility and Maintenance Building Sewage Holding Tanks

These sewage holding tanks are located at the maintenance building and the truck unloading facility. Septic waste is the constituent that has been identified as part of this SWMU. Based on the historical record and the above potential constituents, soil samples were collected to identify potential impact.

One soil sample was collected from 6 to 8 feet below ground surface, a depth below the base of the Maintenance Building Sewage Holding Tank. Three soil samples were collected at the Truck Unloading Building Sewage Holding Tank in a manner similar to that outlined in Section 5.7.1.2 of the WP, in order to determine the vertical extent of contamination. The soil sampling locations and analytical results for SWMU #44 and #45 are presented in Figures 5-3.9i and 5-3.9j, respectively. The soil samples collected from within SWMU #44 and #45 were sent to the laboratory for the analysis of VOCs, SVOCs, chloride and metals within the soil at the base of the pits. Chloride was selected as an indicator to determine whether the sewage holding tanks leaked.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
S44:SL:SL01-04	8-10	Arsenic	11.6 mg/kg	9.74 mg/kg	2.99 mg/kg
S45:SL:SL01-04	6-8	Arsenic	26.2 mg/kg	9.74 mg/kg	2.99 mg/kg

No chloride detections were observed above the PRG, and no other constituent except for arsenic exceeded applicable standards. The arsenic concentrations are interpreted as naturally-occurring. Therefore, there is no evidence of impact from this facility.

5.4 Areas of Concern

The results of soil and sediment sampling activities within each AOC are presented in the following sections, including a description of the sampling approach in each area. The AOCs at the site are summarized above in Table 4-1.

5.4.1 AOC A – Emergency Drain Tanks

There are 26 empty emergency drain tanks located across the facility along the above-ground transfer piping. These tanks have capacities between 500 and 1,000 gallons, and some are housed in concrete vaults. These tanks are available for emergency use to store filtered acidic waste when the transfer piping needs to be drained during emergency power outages or repairs. According to the facility's operational record, none of these tanks have had a release and many have never been used. Acids, D004-D011 metals, and VOCs are the potential waste constituents that may be associated with this AOC.

Sampling Summary

To characterize surface soils around these tanks, 18 samples were collected using split-spoon samplers. Some of the tanks are positioned in groups of two or three, so in these locations a single sample was taken to characterize more than one tank. Additionally, two field duplicate samples, one matrix/matrix spike duplicate sample, and two geotechnical samples were collected at various locations in AOC A. The locations of these soil samples and the transfer pipeline maintenance tanks are presented in Figures 5-4.1a through 5-4.1d. The soil samples were analyzed for the project parameters described in Section 1.4.2 of the QAPP.

AOC	Grid Node Sample	Select Sample	Surface Sample	Geotechnical	QC
#ACA- Emergency Drain Tanks	-	-	18	2	2 FD 1 MS/MSD

Sampling Discussion

The results of this sampling (shown below) indicate that none of these samples exceed applicable standards, except for arsenic in six samples and three SVOCs in one sample. The arsenic concentrations observed in the soil are within the background range. Therefore, these results are interpreted as natural conditions and not indicative of facility impact. Concentrations of other target metals also exceed average background values in many samples, but did not exceed the corresponding PRGs (see Appendix D).

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
ACA:SL:SF05-01	0-2	Arsenic	12 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF06-01	0-2	Arsenic	11.3 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF07-01	0-2	Arsenic	9.8 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF08-01	0-2	Arsenic	15.5 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF11-01	0-2	Arsenic	12.8 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF12-01	0-2	Arsenic	10.5 mg/kg	9.74 mg/kg	2.99 mg/kg
ACA:SL:SF15-01	0-2	Benzo(b)fluoranthene	5.30 mg/kg	NA	3.59 mg/kg
		Dibenz(a,h)anthracene	0.74 mg/kg	NA	0.36 mg/kg
		Benzo(a)pyrene	4.30 mg/kg	NA	0.36 mg/kg

NA- not applicable for non-metal parameters

The SVOCs that exceeded the PRGs are not potential waste constituents for this AOC, and do not appear to be related to possible releases from the emergency tanks. These SVOCs are commonly-associated with asphalt or other paving-related material and may represent unavoidable inclusion of such material in the sample. Since they only exceeded the standard in one sample, they will not be considered further.

5.4.2 AOC B - North Parking Lot - Truck Unloading Facility

This area was identified as an AOC during the visual site inspection (VSI) conducted prior to RFI scoping. In the past, this area was used as a 90-day storage area for roll-off boxes and drums. Acids, D004-D011 metals, PCBs, and VOCs are the potential waste constituents associated with this AOC.

Sampling Summary

To characterize this AOC, two surface soil samples were collected at the locations indicated Figure 5-4.2. These sampling locations were based on surface drainage patterns. Additionally, one field duplicate sample, one matrix/matrix spike duplicate, and one geotechnical and geotechnical duplicate sample were collected in AOC B. The soil samples were analyzed for the project parameters described in Section 1.4.2 of the QAPP.

AOC	Grid Node Sample	Surface Sample	Geotechnical	Geotechnical Duplicate	QC
#ACB- North Parking Lot, Truck Unloading Facility	-	2	1	1	1 FD 1 MS/MSD

Sampling Discussion

The sampling results, shown below, indicate that none of the applicable standards were exceeded by these samples, except for chromium and a few SVOCs in one sample. The arsenic PRG was exceeded in the duplicate of this sample (10.1 mg/kg).

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
ACB:SL:SF01-01	0-2	Chromium	64.5 mg/kg	28.34 mg/kg	64.05 mg/kg
		Benzo(a)anthracene	5,200 µg/kg	NA	3,590 µg/kg
		Benzo(a)pyrene	7,600 µg/kg	NA	360 µg/kg
		Benzo(b)fluoranthene	10,000 µg/kg	NA	3,590 µg/kg
		Dibenz(a,h)anthracene	1,500 µg/kg	NA	360 µg/kg
		Indeno(1,2,3-cd)pyrene	6,200 µg/kg	NA	3,590 µg/kg

NA- not applicable for non-metal parameters

The arsenic results are interpreted as naturally-occurring, since they are within the range of the background samples. The chromium exceedance was not confirmed in the duplicate sample. Thus, there does not appear to be any impact related to possible releases from this AOC. The SVOC detections are likely related to asphalt or paving materials that were included with the sample and are not interpreted as relating to potential facility impact.

5.4.3 AOC C - Pug Mill Staging Area (Hay Mill)

The Hay Mill area consists of concrete foundations from a former farmhouse and silos, and is located west of Injection Well 5. This area was identified due to the sludge-fixing equipment ("Pug Mill") that was stored at this location following decontamination in 1984. The Pug Mill, which was intended to be used to solidify and fix sludges prior to emplacement in former surface impoundments, was found to be too slow a method. Consequently, the use of the Pug Mill was short-lived. It was decontaminated in June 1984 and moved to the Hay Mill area. In September 1995, 35 wipe samples were collected from the unit and analyzed for PCBs. All results were below detection limits. The area was then certified clean-closed by the OEPA in 1996, and the unit was later removed from the site.

Sampling Summary

One surface soil sample and one geotechnical sample were collected to characterize this AOC, under the location where the equipment was previously stored. This sample represents soil at the most potentially-contaminated location in this area. The locations of these soil samples are presented in Figure 5-4.3. The soil samples were analyzed for the project parameters described in Section 1.4.2 of the QAPP.

AOC	Grid Node Sample	Surface Sample	Geotechnical	Geotechnical Duplicate	QC
#ACC- Pug Mill	-	1	1	1	1 FD 1 MS/MSD

Sampling Discussion

The sampling results indicate that none of the potential contaminants (except for arsenic) were detected above PRGs at this location. The arsenic detection did not exceed the average background concentration, and is interpreted as representing naturally-occurring conditions.

5.4.4 AOC D - Borrow Pit #1

Borrow Pit #1 was located to the west of former Surface Impoundment 12 (SWMU #11). It was created as a borrow pit for soils to be used to increase the height of the dikes for Surface Impoundments 11 and 12 (SWMUs #10 and #11). This area was identified due to the previous demolition debris staging area on the north side of the pit. The entire area was addressed during clean closure of Surface Impoundments 11 and 12.

Soil samples were collected as part of this interim remedial activity, and the OEPA later approved the clean-closure of these two surface impoundments. Therefore, in accordance with the approved WP, no sampling was conducted at this AOC. Clean-closure soil sampling data are included in Appendix G.

5.4.5 AOC E - Borrow Pit #2

Borrow Pit #2 was initially excavated to provide clay and fill material for the closure of Surface Impoundments 4, 5, and 7 in 1985. Clay and fill material from the pit was used for the closure of several other areas as the need for fill continued across the site. The pit was enlarged further when clay was used to cap the TSCA Closure Cell. After these remedial activities were completed, Borrow Pit #2 was allowed to fill with surface water run-off and is now a freshwater lake and wildlife habitat.

Surface water entering this area originates from the large, undeveloped areas south of Borrow Pit #2 and west of the main facility operations area. Flow control gates, which are part of the surface water management system, prevent potential releases of waste from entering the borrow pit area. Therefore, in accordance with the approved WP, no sampling was conducted at this AOC.

5.4.6 AOC F - Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale

This AOC consists of the active truck sampling area, the active scale and receiving trailer, the inactive (old) truck scale, and an underground storage tank that is housed within a concrete vault. In the past, the vault was used to collect rain and snowmelt from the covered truck sampling area, but is no longer in use. Rain and snowmelt collected under the active scale is now diverted to the stormwater management system.

Various acids, D004-D011 metals, phenols, and VOCs are potential waste constituents in these areas. Based on the historical record and the above potential constituents, one surface soil sample was collected at the location where run-off from the active scale is diverted to the surface drainage ditch system.

Sampling Summary

One additional surface soil sample was collected on the entrance side of the inactive truck scale. These samples were collected at the most potentially-contaminated locations. One field duplicate sample, one matrix/matrix spike duplicate sample, and one geotechnical sample were collected within AOC F. The locations of these soil samples are presented in Figures 5-4.6a and 5-4.6b. The soil samples were analyzed for the project parameters described in Section 1.4.2 of the QAPP.

AOC	Grid Node Sample	Surface Sample	Geotechnical	Geotechnical Duplicate	QC
# AOC F – Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale	-	2	1	-	1 FD 1 MS/MSD

Sampling Discussion

The sampling results (shown below) indicate that none of the potential organic contaminants were detected above PRGs at this location. Some of the target metal concentrations exceeded average background values (see Appendix D), but only arsenic exceeded the corresponding PRG. As explained above, the arsenic detections are interpreted as representing naturally-occurring conditions because they correspond to the range of background concentrations observed for arsenic.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
ACF:SL:SF01-01	0-2	Arsenic	10 mg/kg	9.74 mg/kg	2.99 mg/kg
ACF:SL:SF02-01	0-2	Arsenic	10.4 mg/kg	9.74 mg/kg	2.99 mg/kg

5.4.7 AOC G - Roll-Off Staging Pad

This AOC consists of the area used to stage roll-off boxes containing filter cake from the filter press building. After sampling and disposal approval, these roll-offs are sent offsite for disposal. The roll-off pad, which was built in 1991, features concrete berms that surround the pad. No known releases are documented to have occurred around the roll-off pad. Therefore, in accordance with the approved WP, no sampling was conducted at this AOC.

5.4.8 AOC H - Facility Aboveground Transfer Piping

Aboveground transfer piping exists across the entire facility. This piping transfers wastes from the T-Tanks to each of the injection wells, through each of the FATs. Acids, D004-D011 metals, phenols and VOCs are potential waste constituents in this AOC. Eight releases along the aboveground transfer piping have been documented since 1993. All of these releases were remediated after their occurrences

Sampling Summary

To assess these historic spills, surface soil samples were collected adjacent to the above ground piping at six of the release areas. The releases for Incident #15 (February 7, 1995) and #600 (February 16, 1993) were addressed by surface soil sampling that was performed at SWMU #23 (SWMU Group G). Therefore, no additional sampling was conducted at these areas.

Eight additional sediment samples were collected in Meyers Ditch between the plant entrance and the flow control gate at Little Raccoon Creek, and three sediment samples were collected in Little Raccoon Creek. In Little Raccoon Creek, one background sample (ACH:SD:SD03-01) was collected about 2,000 feet upstream of the confluence with Meyers Ditch. A second sample was collected about ½-mile downstream of the confluence (at the first east-west road), and a third sample was collected about 1½-miles downstream of the confluence (at the first north-south road). These samples are summarized below.

AOC	Surface Sample	Sediment Sample	Geotechnical	QC
# AOC H – Facility Aboveground Transfer Piping	6	11	-	-

The locations of these soil samples are presented in Figure 5-4.8a. The sediment sampling locations in Meyers Ditch and Little Raccoon Creek are shown in Figures 5-4.8b through 5-4.8d. The soil samples were analyzed for the project parameters described in Section 1.4.2 of the QAPP.

Sampling Discussion

The results for the surface soil samples (shown below) indicate that none of the potential contaminants were detected above PRGs at this location, except for arsenic. Some of the target metal concentrations exceeded average background values (see Appendix D), but only arsenic exceeded the corresponding PRG. As explained above, the arsenic detections are interpreted as representing naturally-occurring conditions because they correspond to the range of background concentrations observed for arsenic.

Sample	Depth Interval (ft)	Parameter	Result	Average Background	Region 9 PRG
ACH:SL:SF04-01	0-2	Arsenic	10.3 mg/kg	9.74 mg/kg	2.99 mg/kg
ACH:SL:SF05-01	0-2	Arsenic	10.7 mg/kg	9.74 mg/kg	2.99 mg/kg

In accordance with the approved WP, the sediment sampling results were compared to Ecotox thresholds. As noted above (Section 5.1), USEPA Region 5 Ecological DQLs were also used as a secondary screening standard. These results (shown below) indicate that none of the potential non-metal contaminants were detected above PRGs at this location, except for cresol (methylphenol) in two locations, cyanide in two locations, and DDT in one location. Note that samples with low numbers (e.g., ACH:SD:SD01) are farther downstream than samples with higher numbers (e.g., ACH:SD:SD06).

Some of the target metal concentrations exceeded average background values (see Appendix D), but only arsenic, mercury (one location), nickel, and zinc (one location) exceeded the corresponding standard. The arsenic detections appear to correspond to the range of concentrations observed in the background soil samples and therefore are interpreted as naturally-occurring. These results do not demonstrate a particular trend, such as the presence of several target parameters with concentrations decreasing downstream. Thus, the results cannot clearly be attributed to facility impact. Most of the concentrations do not exceed their corresponding ecological thresholds by a significant factor.

Sample	Location	Parameter	Result	Ecotox Threshold	Region 5 EDQL
ACH:SD:SD01-01	Little Raccoon Creek (furthest downstream)	Arsenic	6.4 mg/kg	-	5.9 mg/kg
		Nickel	22.9 mg/kg	21 mg/kg	16 mg/kg
		3,4-methyphenol	220 µg/kg	-	0.808 µg/kg
		Cyanide	0.61 mg/kg	-	0.001 mg/kg
ACH:SD:SD03-01	Little Raccoon Creek (midstream)	Nickel	22 mg/kg	21 mg/kg	-
ACH:SD:SD04-01	Meyers Ditch (near Ohio Turnpike)	Arsenic	11.2 mg/kg	-	5.9 mg/kg
ACH:SD:SD05-01	Meyers Ditch (near Borrow Pit #2)	Arsenic	11.7 mg/kg	-	5.9 mg/kg
ACH:SD:SD06-01	Meyers Ditch (near former rail grade)	Arsenic	9.5 mg/kg	-	5.9 mg/kg
		Nickel	29.5 mg/kg	21 mg/kg	16 mg/kg
		4,4'-DDT	2.3 µg/kg	1.6 µg/kg	1.19 µg/kg
		3,4-methylphenol	210 µg/kg	-	0.808 µg/kg
ACH:SD:SD08-01	Meyers Ditch (750 feet upstream of former rail grade)	Arsenic	8.5 mg/kg	-	5.9 mg/kg
ACH:SD:SD09-01	Meyers Ditch (250 feet north of Route 412)	Nickel	27.2 mg/kg	21 mg/kg	16 mg/kg
		Arsenic	6.1 mg/kg	-	5.9 mg/kg
		Nickel	22.7 mg/kg	21 mg/kg	16 mg/kg
ACH:SD:SD10-01	Meyers Ditch (at Route 412)	Cyanide	0.32 mg/kg	-	0.001 mg/kg
ACH:SD:SD11-01	Meyers Ditch (at plant entrance)	Mercury	0.22 mg/kg	0.15 mg/kg	0.174 mg/kg
		Arsenic	8.7 mg/kg	-	5.9 mg/kg
		Nickel	28.1 mg/kg	21 mg/kg	16 mg/kg
		Zinc	133 mg/kg	-	120 mg/kg
		Cyanide	0.58 mg/kg	-	0.001 mg/kg

5.4.9 AOC I - Remaining Underground Piping

According to facility records, underground piping was present at various locations across the facility. This piping, installed at an approximate depth of 4 feet bgs, was used to transfer liquid wastes between the process areas and the injection wells. The underground piping reportedly was constructed of PVC, fiberglass, steel, or ceramic materials. Gravel-lined pipe trenches, or gravel and loose fill near the pipe trenches, were suspected as potential pathways for contamination resulting from incidental spills in the roadways or transfer areas, or from previous surface impoundments at the site. However, most of this piping, if not all, is believed to have been removed as the facility installed the current above-ground piping system.

To determine if the underground piping was removed, Earth Tech reviewed facility records to document the previous locations of underground piping. Geophysical survey locations were chosen based upon this information (Figure 5-4.9). Four survey baselines (A, B, C, and D) and transects were laid out in each area. The geophysical methods included a Ground Penetrating Radar (GPR) survey, supplemented with a Geonics EM-31 electromagnetic survey that can detect buried metal objects and measure the electrical conductivity of the ground.

The GPR survey began with a pilot test in an area where underground piping is known to exist; the objective of this test was to determine if the high clay-content soils at the site have a masking effect on the ability of GPR to distinguish the piping. The pilot test was conducted in an area west of the truck unloading facility where an abandoned underground pipeline is present. Once survey locations were set up, both geophysical instruments were calibrated. The field team tested the GPR unit over a 2-foot diameter metal culvert at an approximate depth of 3 feet bgs, adjacent to Filter Building No. 2. This culvert was selected due to its close proximity to transect A, and its depth in relation to the expected depth of the buried pipelines. The GPR system showed excellent resolution of this object.

The EM-31 could not be calibrated using the culvert as a target. The poor results from the EM-31 were determined to be due to the culvert material (corrugated steel) and the presence of nearby power lines. The EM-31 was finally calibrated over a 2-inch diameter pipe made of iron. Large meter fluctuations (including negative values) were observed over a short distance across the pipe, confirming the functionality of the equipment and its sensitivity in detecting possible buried metallic piping.

GPR testing was then performed along the four baselines. Surveys were run along transects that were perpendicular to the baselines at 10- to 40-foot intervals. Continuous readings were obtained with the GPR unit, while EM-31 readings were taken approximately every 6 feet along the transect. The GPR data were manipulated and analyzed utilizing a software package supplied by the manufacturer.

Except for survey area A and a portion of survey area D, the GPR system was ineffective for locating buried piping or pipe trenches. This appeared to result from the presence of dense clays in the subsurface, and rainfall during the field effort. Some clays and water are both conductive materials that cause GPR signals to dissipate prematurely. These results contrast with the calibration effort, in which a large, metallic object at a relatively shallow depth (the culvert) was used as a target. The field surveys for buried piping were directed toward small-diameter, possibly non-metallic targets at a greater depth.

The GPR system detected a few anomalies along transect A/50 (station 23 to station 33), transects B/80 and B/130 (between stations 55 and 70), and on transect D/300 (stations 25 to 45 and stations 115 to 130). Each of these locations was investigated by excavating test pits (discussed below). Only one location was found to contain a 2-inch diameter fiberglass pipe; the other three locations consisted of backfill, which may indicate a previous pipe trench that was removed and then backfilled with gravel and cobbles.

The EM-31 was tested in survey areas A, B, and D with poor results. No significant changes in conductivity readings were noted over several transects. The presence of overhead power lines and the subsurface conditions described above (dense clays, rainfall) limited the instrument's ability to detect conductive anomalies.

Following the relatively inconclusive geophysical testing, several test pits were excavated to directly observe evidence of underground piping. The test pits were excavated to a depth of 6 feet bgs to allow for sampling and direct visual characterization of any residual wastes or underground piping that might be encountered. All test pits were excavated with a backhoe; the orientations and dimensions of the test pits were determined in the field based on the historical information and GPR data. A summary of test pit findings is provided in the following table. Test pit locations are presented in Figure 5-4.9.

Test Pit	Dimensions (feet, LxW)	Soil Types	Evidence of Piping	Sample Data
TP-1	10 x 4	Light to dark-brown silty clay	None	None
TP-2	25 x 4	Dark brown silty clay	None	None
TP-3	37 x 3	Dark brown silty clay	None	None
TP-4	30 x 3	Dark brown silty clay	None	None
TP-5	15 x 3	Gray, black, tan cobbles, sand, silt and clay (backfill)	Possible	TP-5
TP-6	10 x 3	Cobbles, sand, silt and clay (backfill)	Possible	TP-6
TP-7	20 x 3	Cobbles, sand, silt and clay (backfill)	Possible	TP-7
TP-8	(hand auger)	Dark brown silty clay	Abandoned pipe present	TP-8

Test pits 1, 2, 3, 5, 6, and 7 were located in areas where geophysical data were collected, and they confirmed the GPR results. Test pit 4 was located near Pump House No. 2, where historical information suggested the presence of underground piping; none was encountered. Test pit 8 was hand-augered under an active aboveground pipeline. The previous piping was exposed in a trench beneath this pipeline and was more easily accessible with a hand auger than with an excavator.

Test pits 1, 2, and 3 showed no evidence of contamination or piping, so no soil samples were collected at these locations. The subsurface conditions at Test Pit 4 also gave no indication of contamination or previous piping, so no sample was collected. In Test Pits 5, 6, and 7, evidence of underground piping and/or potential contamination (soil discoloration) was observed. Potential contamination was defined as soil that showed discoloration, odors, or free product. A sample was collected from the bottom of each of the latter three test pits.

All test pit samples were collected with a 3-inch diameter, stainless steel hand auger from the bottom of the excavation, or from the area that displayed the most evidence of potential contamination. Soil samples collected within this SWMU were analyzed for the parameters described in Section 1.4.2 of the

QAPP. The analytical results indicate no exceedances of standards, except for metals. Several of the target metal concentrations were exceeded in these samples, but none exceeded the corresponding PRG except for arsenic (see result presented below). As explained above, these results are interpreted as representative of natural conditions and do not indicate impact from the former piping.

Test Pit	Sample Depth (ft)	Parameter	Result	Average Background	Region 9 PRG
TP-8	5	Arsenic	19.3 mg/kg	9.74 mg/kg	2.99 mg/kg

5.4.10 AOC J - Area Around Monitoring Well L-19

Monitoring results from well L-19 have indicated the historical presence of 1,2-dichloroethane. This contaminant, however, has not migrated from this location. Investigations have been completed to document and determine the extent of this contaminant. Historical sampling data for this AOC is presented in Appendix G. In accordance with the approved WP, no sampling was conducted at this AOC.

5.5 Geotechnical Soil Samples

Thirty-nine soil samples and five duplicate samples, approximately 10 percent of the total number of soil samples, were collected and analyzed for geotechnical and geochemical properties. These properties included cation exchange capacity, Atterberg Limits, moisture content, grain size distribution, soil pH, and Total Organic Carbon (TOC) content. The purpose of this testing was to determine the physical/chemical characteristics of soil at the site for possible later use in the RFI or QRA.

The geotechnical samples were analyzed using American Society for Testing and Materials (ASTM) Specifications and SOPs, as presented in the QAPP. The resulting data are presented in Table 5-3.

5.6 Supplemental Groundwater Data

As discussed above in Section 5.3.2, historical groundwater data from the facility were reviewed to determine if impacts were evident from the SWMUs that still contain waste material. These data were first validated using the same procedures as were applied to the other Phase I RFI data. These data, as well as the corresponding description of data validation efforts, are presented in Appendix F.

The wells that were monitored during Phase I of the RFI were bedrock wells MW-14R, MW-16R, MW-20R, MW-22R, and MW-24R and lacustrine wells L-17, L-19A, L-20, L-25, and L-26. The wells that were monitored as part of historical activities are listed below.

1993 Historical Data

Wells L-17, L-19A, L-20, L-25, L-26, and MW-22R were monitored during various phases of the facility's groundwater monitoring program and are not part of the current monitoring program. The data from the most recent sampling events in 1993 were reviewed. Quality control data was archived for these wells and was not readily accessible; therefore, a validation review was not performed on the 1993 data at

this time. The 1993 data were examined to determine if there was any correlation or trends evident in comparison to more recent data.

The 1993 data included results from the July and October sampling events for several wells installed in the lacustrine sediments and one well installed in the bedrock. These samples were also analyzed for selected VOCs, PCBs, phenols, metals, field specific conductivity (quadruplicate), and field pH (quadruplicate). The 1993 data, although it could not be fully validated at this time, showed the presence of nickel, and lesser occurrences of chromium and lead, in some of the lacustrine wells. However, the data (see Appendix F) did not display a trend or pattern that could be clearly attributable to impact from the facility; in fact, the concentrations of some of these parameters were higher in the upgradient well.

1997-1999 Historical Data

For MW-14R, MW-16R, MW-20R, and MW-24R, data from the four most-recent semi-annual sampling events were reviewed. These wells have been monitored from 1986 through the present and are part of the current monitoring program; therefore, data from the October 1997, April 1998, October 1998 and April 1999 sampling events were reviewed. This validation review indicated that all of the data were usable.

The 1997-1999 historical monitoring data included samples from several bedrock wells (MW-14R, MW-15R, MW-16R, MW-20R, MW-24R, MW-30R, MW-36R, and MW37R). These samples were analyzed for selected VOCs, PCBs, phenols, metals, field specific conductivity (quadruplicate), and field pH (quadruplicate). With the exception of conductivity and pH, no detections were noted in any of the samples. The downgradient wells (MW-14R, MW-15R, MW-16R, MW-20R, MW-30R, and MW-36R) monitor groundwater in the bedrock beneath the site and are downgradient of the TSCA closure cell and SWMU Group A. The upgradient wells (MW-24R and MW37R) were used as background reference points for this evaluation. The results demonstrate that there is no detectable impact on bedrock groundwater quality from these features (see Appendix F).

The same laboratory that performed the sample analyses for the October 1997 and April 1998 validated data (Environmental Monitoring Laboratories, Inc.) performed the analyses for the 1993 samples. This laboratory had been used by the facility since 1991. The October 1998 and April 1999 sample analyses were performed by Quanterra Laboratories, Inc. In addition, all of the historical groundwater samples were collected using the methods included in the facility's approved Ground Water Monitoring Plan.

6.0 COMMUNITY RELATIONS

As discussed in the approved WP, this RFI included several measures to involve the public. An important aspect of the RFI process, these public involvement measures keep the community informed of Phase I RFI activities at the site and help the agency anticipate and respond to community concerns. This RFI featured a public involvement plan (PIP) that included the following items:

- communicating effectively with people through a Public Information Committee (PIC);
- preparation of fact sheets summarizing Phase I RFI activities; and,
- maintaining an easily accessible repository of information including the permit plans and reports.

These items are discussed in the following paragraphs.

6.1 Public Information Committee

As referenced above, a citizens' committee (the PIC) has existed at WM-Vickery for over 15 years. Its membership consists of the Sandusky County Health Commissioner, three citizens appointed by the Health Commissioner, two members of the Sandusky County Board of Health, and an OEPA official.

The PIC meets regularly at the WM-Vickery facility. These meetings are generally held on a bi-monthly basis. The purpose of the meetings is to answer questions and concerns about facility operations, to hear reports from the OEPA and WM-Vickery on facility activities, and to provide a forum for discussion of current and planned activities at the facility. At times, a special representative from the OEPA will attend these meetings to provide additional information on a certain activity taking place at the facility.

During all stages of the Phase I RFI, these meetings provided a forum to discuss the RFI process and its status. Specifically, during Phase I of the RFI, this committee held meetings at the facility in March, April, July, and September 1999. During each of these meetings, the members were given the opportunity to review the status of the RFI and ask questions pertaining to the project.

6.2 Fact Sheet and Information Repository

All relevant Phase I RFI documents, reports, and supporting information were placed at the Birchard Public Library in Fremont, Ohio. This library was the information repository selected for the project. These documents, plans, and reports were kept up to date throughout the Phase I RFI and were made available to the public during normal operating hours of the library.

7.0 CONCLUSIONS

The results of the Phase I RFI conducted at the Vickery facility were used to formulate several conclusions about the nature and extent of releases, if any, of hazardous waste(s) or hazardous constituent(s) at the site. As mentioned in Section 1, the objective of this Phase I RFI is to obtain the necessary data to characterize the site and determine potential risks to human health and the environment.

7.1 Site Conditions

The Vickery site is located in a relatively level area of north-central Ohio. Elevations at the site generally range between 600 to 616 feet MSL with a slight dip to the north. The natural topography at the site has been altered throughout history by facility improvements and non-facility structures such as the abandoned railroad grade and the Ohio Turnpike embankment to the north.

The site is underlain by a layered hydrogeologic system consisting of lacustrine sediments and a glacial till overlying dolomitic bedrock. Surficial soils at the site were formed on these lacustrine deposits, and consist primarily of stratified silts and clays. The lacustrine deposits are approximately 10 to 20 feet thick and overlie a glacial till approximately 30 feet thick, which lies directly on top of bedrock.

The lacustrine sediments consist mostly of silt and clay, with some sand and gravel. The hydraulic conductivity of these sediments is low. The upper portion of this unit is very homogeneous, with almost no sand or silt layers present, although most samples collected were laminated. The glacial till consists of two separate units: a lower unit consisting of material derived from the bedrock and a thick, clay-rich upper unit. The lower till, which can be up to 10 feet thick, contains sands and gravels and is not found continuously across the site. The upper till deposit consists of silty clay with some sand and traces of gravel. The upper till unit also has a low hydraulic conductivity.

The dense, fine-grained glacial till and lacustrine sediments are aquitards. The hydraulic conductivity of these units ranges from 8.2×10^{-5} to 1.0×10^{-9} cm/sec, based on laboratory tests and in-situ well tests conducted at the facility. Small-scale fractures have been observed in the till and lacustrine deposits at some locations onsite, but none of these fractures appeared to be open. Estimated groundwater flow rates from the lacustrine sediments to bedrock are on the order of 1,000 to 10,000 years.

The dolomite bedrock is found from 40 to 50 feet bgs, beneath the lacustrine deposits and glacial till. The bedrock surface slopes gently downward towards the north. The dolomite at the site is very shaley and contains variable amounts of gypsum. The upper 30 feet of bedrock is extensively and variably fractured and jointed. Voids and solution cavities up to ½ inch in diameter, partially filled with anhydrite and gypsum, are also present in the bedrock. The average hydraulic conductivity of the bedrock aquifer is 6.0×10^{-3} cm/sec, based on several onsite tests.

7.2 General Conclusions

The Phase I RFI analytical data were compared to recognized human health- or ecology-based standards to determine the potential for contamination. These standards included USEPA Region 5 DQLs, Region

9 PRGs, background concentrations of metals for groundwater samples, and Ecotox thresholds and EDQLs for sediment samples.

Background soil samples collected for this purpose originated from areas of the property that had not been used for waste management purposes. Samples were collected in five locations and were analyzed for Appendix IX parameters. Analysis of the background samples revealed the following findings:

- The background samples indicate that metals are naturally present in significant concentrations in facility soils, including arsenic, barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc.
- Average and median concentrations were calculated for each metal, for comparison to the other Phase I RFI samples. However, the number of background soil samples did not allow development of statistically-based reference points.
- The background data show that naturally present concentrations of arsenic frequently exceed the corresponding Region 9 PRG. In part, this is because the PRG for arsenic (2.99 mg/kg) is well below the average background concentration for arsenic (9.74 mg/kg). Background concentrations of chromium also sometime exceed the chromium PRG (64.05 mg/kg), but the background average for chromium (28.34 mg/kg) does not.

In general, the following conclusions can be made about the Phase I RFI sampling results from the SWMUs and AOCs:

- The select (SL), grid node (GN), and surface soil samples indicate that there are no significant releases from the SWMUs and AOCs at the site.
- Most of the soil samples contain arsenic concentrations above the PRG, but these concentrations are typically within the range of arsenic concentrations observed in the background samples. The conclusion is that the arsenic is naturally present in site soils and is not indicative of impact from the site.
- Current groundwater sampling data, and a qualitative review of historical groundwater monitoring data, indicate that there has been no detectable impact on groundwater quality in the surficial sediments or bedrock downgradient of the site. However, a shallow monitoring point upgradient of the TSCA closure cell (L-26) exhibited evidence of impact from some organic compounds.
- The sediment sampling results indicate that there has been no demonstrable impact from the facility on sediment quality in Little Raccoon Creek.

7.2.1 Conclusions for Individual SWMUs

SWMU Group A

SWMU Group A (SWMUs #1, #2, #3, #8, and #16) consists of closed surface impoundments that held wastes during their operation. These wastes are now fixed in place and covered clean clay fill. The sampling results from this group indicate the following:

- Select (SL) samples indicate the presence of several waste-related components (benzo(a)pyrene, dieldrin, 1,1,1-trichloroethane, chlorobenzene, chloroform, tetrachloroethene, toluene, trichloroethene, and methylene chloride) above the PRGs. Since these samples were collected from the fixed waste materials, this is an expected finding.
- The grid node (GN) samples and vertical-delineation samples show that there are no soil impacts below or outside of the SWMU boundaries, except in two locations. At grid node B5, the benzene PRG was exceeded, but this appears to be due to cross-contamination within the borehole. At grid node B6, the PRG for 1,1-dichloroethene was slightly exceeded. However, the next sample below this did not exceed the PRG, and thus appears to be an isolated occurrence.

SWMU Group B

This SWMU Group consists of SWMUs #4, #5, #7, #10, #11, #12, and #53 (the TSCA Closure Cell). All except for the closure cell were certified clean-closed by OEPA. Sampling results indicate the following:

- A groundwater sample from the capillary drain beneath the closure cell exceeded only the cyanide DQL. A sample from an upgradient monitoring point (L-19A) also exceeded the cyanide DQL. These exceedances do not appear to be related to the waste materials that were placed in the closure cell.
- Lacustrine well L-26, which is upgradient of the closure cell, contained several VOCs (benzene, 1,1-dichloroethane, 1,2-dichloroethane, and 1,4-dioxane), arsenic, and lead above their respective DQLs. This may be due to facility activities in the area or other potential offsite sources of surface contamination.
- Monitoring well MW-14R exceeded the DQLs for bis(2-ethylhexyl)phthalate and cyanide.

SWMU Group C

SWMU Group C consists of SWMUs #6 and #9, which contain fixed wastes, and SWMU #19, a former drum storage area. Soil samples collected from this group indicated the following:

- Select (SL) soil samples exceeded the PRGs for benzene, chromium, and lead. Since these samples were collected from the fixed wastes, this is an expected finding.

- Field observations and vertical-delineation sampling results show no evidence of contamination above PRGs beneath the base of the former surface impoundments. The grid node sampling results also confirm this conclusion.
- No PRGs were exceeded in samples from the former drum storage area.

SWMU Group D

This SWMU Group consists of SWMUs #12, #13, and #14. These were former landfarm areas that were closed, backfilled with clean soils, and capped with clay. Soil sampling results indicate the following:

- One sample slightly exceeded the PRG for benzo(a)pyrene. This indicates there is no widespread impact from these former waste management areas.
- Most of the soil samples contained arsenic above the PRG, but these results are interpreted to represent natural conditions and not due to migration of contamination, as discussed above for SWMU Group A.

SWMU Group E

SWMU Group E consists of several former injection wells (SWMUs #50, #51, and #52). Surficial soil samples collected around the locations of these SWMUs indicated the following:

- Some of the metals concentrations exceeded average background but did not exceed their corresponding PRGs. The concentrations of all other constituents were also below PRGs. Therefore, there is no evidence of impact from these former injection wells.

SWMU Group F

SWMU Group F consists of several filtered acid tanks and associated pump houses (SWMU #31 through #40). Surface soil samples collected at these locations indicated the following:

- There were no exceedances of applicable standards, except for arsenic and chromium. Therefore, there is no evidence of contamination from these facilities.
- The arsenic PRG was exceeded in all samples, and the chromium PRG was exceeded in one sample. As with SWMU Group A, however, the arsenic concentrations are interpreted as the result of natural conditions and not indicative of facility impact.

SWMU Group G

SWMU Group G consists of SWMUs #21 through #27, #29, and #30, which include the truck unloading area, various tanks, filter presses, and pump houses. The sampling activities conducted within this group were somewhat modified based on the nature of each SWMU. Several units were not sampled because there was no evidence or records of a release or potential release; these include the truck unloading area, the grit filters, the caustic gas scrubber, the T-Tanks, and the T-Tank pump house. Soil sampling at the other locations indicates the following:

- There were no exceedances of applicable standards, although the average background concentrations of target metals were exceeded in several samples. Therefore, there is no evidence of contamination from these facilities.
- The arsenic PRG was exceeded in most of the samples, but these results are interpreted as the result of natural conditions.

SWMU Group H

SWMU Group H consists of SWMUs #46 through #49, which are the active injection wells at the site. Surface soil samples collected around each injection well indicate the following:

- None of the soil samples exceeded applicable standards, except for arsenic. Only one sample exceeded the average background concentration for arsenic. The arsenic results are interpreted as the result of natural conditions. Therefore, there is no indication of facility impact.

SWMU Group I

SWMU Group I consists of various tanks (SWMU #18, #20, #42, #44, and #45), the former oil recovery area (SWMU #15), the former sluice pit (SWMU #28), and the facility's sanitary wastewater treatment facility (SWMU #43). The sampling results indicate:

- Remediation conducted in the oil recovery area was sufficient, as no PCB or SVOC exceedances were noted. Only one sample exceeded the background concentration for chromium.
- No evidence of contamination was apparent at the lab waste tank (SWMU # 20).
- None of the potential waste constituents exceeded applicable standards at the PCB storage area, except for arsenic and benzo(a)pyrene. The arsenic concentrations are interpreted as naturally-occurring. The benzo(a)pyrene detection does not indicate significant impact at this concentration.
- There is no evidence of impact from sanitary wastewater treatment facility.

- There is no evidence of impact from the Truck Unloading Facility and Maintenance Building Sewage Holding Tanks.

7.2.2 Conclusions for Individual AOCs

AOC A – Emergency Drain Tanks

Soil sampling to characterize surface soil around these tanks indicated the following:

- SVOCs that exceeded the PRGs are not potential waste constituents for this AOC, and do not appear to be related to possible releases from the emergency drain tanks.
- The arsenic PRG was exceeded in all samples, but these results are interpreted as naturally-occurring. Concentrations of other target compounds did not exceed the corresponding PRGs.

AOC B - North Parking Lot - Truck Unloading Facility

Surface soil samples collected to characterize this AOC indicated the following:

- There are no impacts related to possible releases from this AOC. SVOC detections above the PRG in one sample may be due to paving materials that could have been included in the sample.
- The arsenic PRG was exceeded in both samples and the chromium PRG was exceeded in one sample. However, these results are interpreted as naturally-occurring.

AOC C - Pug Mill Staging Area (Hay Mill)

Soil samples collected to characterize the area where the Pug Mill was formerly stored indicate the following:

- None of the potential contaminants (except for arsenic) were detected above PRGs at this location. The arsenic detection is interpreted as representing naturally-occurring conditions.

AOC D - Borrow Pit #1

This AOC consists of Borrow Pit #1, which was the origin of soils to be used to increase the height of the dikes for Surface Impoundments 11 and 12 (SWMUs #10 and #11). The area was clean-closed; no sampling was conducted at this AOC.

AOC E - Borrow Pit #2

Borrow Pit #2 provided clay and fill material for the closure of Surface Impoundments 4, 5, and 7, and several other areas needed. The pit was allowed to fill with water and is now a wildlife habitat. In accordance with the approved WP, no sampling was conducted at this AOC.

AOC F - Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale

This AOC consists of the active truck sampling area, the active scale and receiving trailer, the inactive (old) truck scale, and an underground storage tank, housed within a concrete vault, that is used to collect rain and snowmelt from the covered truck sampling area. Sampling results from this AOC indicate:

- There is no evidence of impact from these facilities, since none of the potential contaminants were detected above PRGs. Arsenic detections that exceeded the PRG are interpreted as representing naturally-occurring conditions.

AOC G - Roll-Off Staging Pad

This AOC consists of the area used to stage roll-off boxes containing sludge from the filter press building. In accordance with the approved WP, no sampling was conducted at this AOC.

AOC H - Facility Aboveground Transfer Piping

Aboveground transfer piping exists across the entire facility. Soil samples were collected to assess historic spills that have occurred along the piping. In addition, sediment samples were collected in several surface water drainages that receive runoff from these areas. The sampling results indicate the following:

- No impact was evident in the surface soil samples from the transfer piping.
- No impact was evident in the sediment samples, except for mercury (one location), nickel, and zinc (one location). The results did not demonstrate a particular trend, and thus cannot clearly be attributed to facility impact. Most of the concentrations do not exceed their corresponding ecological thresholds by a significant factor.
- Arsenic concentrations exceeded average background in some samples, but this is interpreted as naturally-occurring.

AOC I - Remaining Underground Piping

Geophysical methods were used to determine if any underground piping, which has not been used at the facility for several years, was left in place. Test pits were then excavated in selected areas to confirm survey results or to augment the geophysical data. The results of these surveys indicate the following:

- GPR and EM methods were inconclusive due to site conditions at the time of the survey.
- No evidence of contamination or piping was observed in Test Pits 1, 2, 3, or 4.
- Evidence of underground piping and/or potential contamination was observed in Test Pits, 5, 6, and 7.
- Samples collected from these test pits showed no detectable impact from the piping.

AOC J - Area Around Monitoring Well L-19

Monitoring results from well L-19 indicate that the historical presence of 1,2-dichloroethane has not migrated from this location. In accordance with the approved WP, no sampling was conducted at this AOC.

7.2.3 Conclusions for Supplemental Groundwater Data

The April and October 1997 and April 1998 monitoring data demonstrate that there is no detectable impact on bedrock groundwater quality from the features monitored by the bedrock wells.

The 1993 data (from July and October sampling events) showed the presence of nickel, and lesser occurrences of chromium and lead, in some of the lacustrine and till wells. However, the data did not display a trend or pattern that could be clearly attributable to impact from the facility; in fact the concentrations of some of these parameters were higher in the upgradient wells.

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RCRA Facility Investigation (RFI) Phase I Report

Volume 2 (Tables and Figures)

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TABLE OF CONTENTS

<u>Section</u>	<u>Page Number</u>
VOLUME 1	
EXECUTIVE SUMMARY	Page 1 of 8
GLOSSARY	Page 1 of 2
1.0 INTRODUCTION.....	Page 1 of 4
1.1 Project Objectives	Page 1 of 4
1.2 Site Background.....	Page 2 of 4
1.2.1 Site Location and Setting	Page 2 of 4
1.2.2 Site History	Page 2 of 4
1.2.3 Present Conditions	Page 3 of 4
1.2.4 Previous Investigations and Reports.....	Page 3 of 4
1.2.5 Future Activities	Page 4 of 4
2.0 SITE DESCRIPTION.....	Page 1 of 3
2.1 General Information.....	Page 1 of 3
2.2 Site Geology and Soils.....	Page 1 of 3
2.2.1 Bedrock	Page 1 of 3
2.2.2 Glacial Deposits	Page 1 of 3
3.0 HYDROGEOLOGY.....	Page 1 of 3
3.1 Previous Investigations	Page 1 of 3
3.1.1 Groundwater Flow in the Bedrock.....	Page 1 of 3
3.1.2 Groundwater Flow in the Surficial Deposits.....	Page 2 of 3
4.0 INVESTIGATIVE PROCEDURES.....	Page 1 of 20
4.1 Identification of SWMUs and AOCs	Page 1 of 20
4.2 Field Sampling Plan.....	Page 1 of 20
4.2.1 Data Quality Objectives	Page 1 of 20
4.2.2 Approval by EPA	Page 3 of 20
4.2.3 Sample Collection Methods.....	Page 3 of 20
4.3 Sampling Procedures.....	Page 3 of 20
4.3.1 Preliminary Sampling Activities.....	Page 4 of 20
4.3.2 Soil and Sediment Sample Collection Procedures.....	Page 6 of 20
4.3.2.1 Select Location Sampling Procedures.....	Page 7 of 20
4.3.2.2 Grid Node Sampling Procedures.....	Page 8 of 20
4.3.3 Surface Soil Sample Collection Procedures.....	Page 10 of 20
4.3.4 Sediment Sample Collection Procedures.....	Page 10 of 20
4.4 Groundwater Sampling	Page 11 of 20

TABLE OF CONTENTS
(Continued)

Section	Page Number
4.5 Analytical Parameters	Page 12 of 20
4.6 Sample Custody	Page 13 of 20
4.7 Quality Control Sample Collection.....	Page 13 of 20
4.7.1 QC Samples.....	Page 14 of 20
4.7.2 Field Instrument QC.....	Page 15 of 20
4.8 Data Validation	Page 15 of 20
4.9 Potable Water Supply.....	Page 16 of 20
4.10 Decontamination Procedures	Page 16 of 20
4.10.1 Decontamination Area	Page 16 of 20
4.10.2 Decontamination Procedures	Page 16 of 20
4.10.3 Investigation-Derived Wastes.....	Page 17 of 20
4.11 Geophysical Investigation.....	Page 17 of 20
4.12 Health and Safety Procedures	Page 19 of 20
4.13 Borehole Abandonment Procedures.....	Page 20 of 20
5.0 RESULTS AND FINDINGS	Page 1 of 33
5.1 Standards for Comparison.....	Page 1 of 33
5.2 Background Soil Sampling	Page 2 of 33
5.3 Solid Waste Management Units.....	Page 2 of 33
5.3.1 SWMU Group A	Page 3 of 33
5.3.2 SWMU Group B	Page 6 of 33
5.3.3 SWMU Group C	Page 8 of 33
5.3.4 SWMU Group D	Page 10 of 33
5.3.5 SWMU Group E.....	Page 12 of 33
5.3.6 SWMU Group F.....	Page 13 of 33
5.3.7 SWMU Group G	Page 15 of 33
5.3.8 SWMU Group H.....	Page 17 of 33
5.3.9 SWMU Group I.....	Page 19 of 33
5.4 Areas of Concern	Page 24 of 33
5.4.1 AOC A - Emergency Drain Tanks.....	Page 24 of 33
5.4.2 AOC B - North Parking Lot - Truck Unloading Facility.....	Page 25 of 33
5.4.3 AOC C - Pug Mill Staging Area (Hay Mill).....	Page 26 of 33
5.4.4 AOC D - Borrow Pit #1	Page 26 of 33
5.4.5 AOC E - Borrow Pit #2.....	Page 27 of 33
5.4.6 AOC F - Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale	Page 27 of 33
5.4.7 AOC G - Roll-Off Staging Pad	Page 28 of 33
5.4.8 AOC H - Facility Aboveground Transfer Piping.....	Page 28 of 33

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Page Number</u>
5.4.9 AOC I - Remaining Underground Piping	Page 30 of 33
5.4.10 AOC J - Area Around Monitoring Well L-19.....	Page 32 of 33
5.5 Geotechnical Soil Samples.....	Page 32 of 33
5.6 Supplemental Groundwater Data.....	Page 32 of 33
6.0 COMMUNITY RELATIONS	Page 1 of 1
6.1 Public Information Committee.....	Page 1 of 1
6.2 Fact Sheet and Information Repository.....	Page 1 of 1
7.0 CONCLUSIONS	Page 1 of 8
7.1 Site Conditions.....	Page 1 of 8
7.2 General Conclusions	Page 1 of 8
7.2.1 Conclusions for Individual SWMUs	Page 3 of 8
7.2.2 Conclusions for Individual AOCs	Page 6 of 8
7.2.3 Conclusions for Supplemental Groundwater Data.....	Page 8 of 8
8.0 REFERENCES	Page 1 of 1

VOLUME 2

LIST OF TABLES

<u>Table Number</u>	
4-1	Summary of Solid Waste Management Units/Areas of Concern
4-2	Appendix IX Parameter List (40 CFR 264)
4-3	Analytical Methods, Holding Times and Preservation Methods
4-4	Clyde Water Supply Data (Decontamination Water)
5-1	Project Standards
5-2	Background Metals Data
5-3	Geotechnical Data

LIST OF FIGURES

Figure Number

- 1-1 Site Location Plan
- 1-2 Former Surface Impoundment Locations
- 1-3 Existing Facility Features
- 1-4 Locations of Solid Waste Management Units
- 1-5 Locations Of Areas Of Concern
- 2-1 Geologic Cross Sections
- 3-1 Groundwater Monitoring System Well Locations
- 4-1 Locations of Solid Waste Management Unit Groups and Areas of Concern
- 5-1 [Reserved]
- 5-2 [Reserved]
- 5-2.1a Background Soil Sample Location Map**
- 5-2.1b Background Soil Sample Analytical Results Map
- 5-2.1c Background Soil Sample Analytical Results Map
- 5-3.1a Solid Waste Management Unit Group A (01, 02, 03, 08 & 16) Location Map**
- 5-3.1b Solid Waste Management Unit 01 Analytical Results Map
- 5-3.1c Solid Waste Management Unit 02 Analytical Results Map
- 5-3.1d Solid Waste Management Unit 03 Analytical Results Map
- 5-3.1e Solid Waste Management Unit 08 Analytical Results Map
- 5-3.1f Solid Waste Management Unit 16 Analytical Results Map
- 5-3.1g Solid Waste Management Unit 16 Analytical Results Map
- 5-3.1h Solid Waste Management Unit 16 Analytical Results Map
- 5-3.2a Solid Waste Management Unit Group B (04, 05, 07, 10, 11, 17 & 53) Location Map**
- 5-3.2b Solid Waste Management Unit Group B (Bedrock Monitoring Wells) Analytical Results Map
- 5-3.2c Solid Waste Management Unit Group B (Lacustrine Monitoring Wells) Analytical Results Map
- 5-3.2d Solid Waste Management Unit Group B (Lacustrine Monitoring Wells) Analytical Results Map
- 5-3.3a Solid Waste Management Unit Group C (06, 09 & 19) Location Map**
- 5-3.3b Solid Waste Management Unit 06 Analytical Results Map
- 5-3.3c Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3d Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3e Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3f Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3g Solid Waste Management Unit 09 Analytical Results Map
- 5-3.3h Solid Waste Management Unit 19 Analytical Results Map
- 5-3.4a Solid Waste Management Unit Group D (12, 13 & 14) Location Map**
- 5-3.4b Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4c Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4d Solid Waste Management Unit 12 Analytical Results Map
- 5-3.4e Solid Waste Management Unit 13 Analytical Results Map

LIST OF FIGURES

(Continued)

Figure Number

- 5-3.4f Solid Waste Management Unit 13 Analytical Results Map
- 5-3.4g Solid Waste Management Unit 13 Analytical Results Map
- 5-3.4h Solid Waste Management Unit 14 Analytical Results Map
- 5-3.4i Solid Waste Management Unit 14 Analytical Results Map
- 5-3.5a Solid Waste Management Unit Group E (50, 51, & 52) Location Map**
- 5-3.5b Solid Waste Management Unit 50 Analytical Results Map
- 5-3.5c Solid Waste Management Unit 51 Analytical Results Map
- 5-3.5d Solid Waste Management Unit 52 Analytical Results Map
- 5-3.6a Solid Waste Management Unit Group F (31, 32, 33, 34, 35, 36, 37, 38, 39, & 40) Location Map**
- 5-3.6b Solid Waste Management Units 31 & 32 Analytical Results Map
- 5-3.6c Solid Waste Management Units 33 & 34 Analytical Results Map
- 5-3.6d Solid Waste Management Units 35 & 36 Analytical Results Map
- 5-3.6e Solid Waste Management Units 37 & 38 Analytical Results Map
- 5-3.6f Solid Waste Management Units 39 & 40 Analytical Results Map
- 5-3.7a Solid Waste Management Unit Group G (23, 27, 29 & 30) Location Map**
- 5-3.7b Solid Waste Management Unit 23 Analytical Results Map
- 5-3.7c Solid Waste Management Unit 27 Analytical Results Map
- 5-3.7d Solid Waste Management Unit 29 Analytical Results Map
- 5-3.7e Solid Waste Management Unit 30 Analytical Results Map
- 5-3.8a Solid Waste Management Unit Group H (46, 47, 48, & 49) Location Map**
- 5-3.8b Solid Waste Management Unit 46 Analytical Results Map
- 5-3.8c Solid Waste Management Unit 47 Analytical Results Map
- 5-3.8d Solid Waste Management Unit 48 Analytical Results Map
- 5-3.8e Solid Waste Management Unit 49 Analytical Results Map
- 5-3.9a Solid Waste Management Unit Group I (15, 20, 41, 42, 43, 44, & 45) Location Map**
- 5-3.9b Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9c Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9d Solid Waste Management Unit 15 Analytical Results Map
- 5-3.9e Solid Waste Management Unit 20 Analytical Results Map
- 5-3.9f Solid Waste Management Unit 41 Analytical Results Map
- 5-3.9g Solid Waste Management Unit 42 Analytical Results Map
- 5-3.9h Solid Waste Management Unit 43 Analytical Results Map
- 5-3.9i Solid Waste Management Unit 44 Analytical Results Map
- 5-3.9j Solid Waste Management Unit 45 Analytical Results Map
- 5-4.1a Area of Concern A Analytical Results Map**
- 5-4.1b Area of Concern A Analytical Results Map
- 5-4.1c Area of Concern A Analytical Results Map
- 5-4.1d Area of Concern A Analytical Results Map
- 5-4.2 Area of Concern B Analytical Results Map
- 5-4.3 Area of Concern C Pug Mill Analytical Results Map

LIST OF FIGURES

(Continued)

Figure Number

- 5-4.4 [Reserved]
- 5-4.5 [Reserved]
- 5-4.6a Area of Concern F Location 1 Analytical Results Map
- 5-4.6b Area of Concern F Location 2 Analytical Results Map
- 5.4.7 [Reserved]
- 5-4.8a Area of Concern H Analytical Results Map
- 5-4.8b Area of Concern H Analytical Results Map
- 5-4.8c Area of Concern H Analytical Results Map
- 5-4.8d Area of Concern H Little Raccoon Creek Analytical Results Map
- 5-4.9 Area of Concern I Analytical Results Map

LIST OF APPENDICES

Appendix

VOLUME 3

- A Field Quality Control Forms
- B Borehole Log Forms
- C Daily Field Report Forms
- D Summary of Background Exceedances
- E Summary of Exceedances of Applicable Standards
- F Historical Groundwater Data and Validation Report

VOLUME 4

- G Closure Report Data

VOLUME 5

- H Summary of Analytical Data

VOLUMES 6 & 7

- I Analytical Data Validation Reports

TABLES

TABLE 4-1
SUMMARY OF SOLID WASTE MANAGEMENT UNITS / AREAS OF CONCERN
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

SWMU Group/Area of Concern	SWMU's/Titles	Rationale for Grouping
Group A	SWMU # 1 - Pond 1 SWMU # 2 - Pond 2 SWMU # 3 - Pond 3 SWMU # 8 - Pond 9 and Wet Well SWMU # 16 - Temporary Waste Pile Area	These SWMUs are grouped together due to their inclusion within a larger SWMU (SWMU # 16 sits around the perimeter of the other SWMUs)
Group B	SWMU # 4 - Pond 4 SWMU # 5 - Pond 5 SWMU # 7 - Pond 7 SWMU # 10 - Pond 11 SWMU # 11 - Pond 12 SWMU # 17 - Leachate Retention Pond SWMU # 53 - TSCA Closure Cell	These SWMUs are grouped together due to their clean closed status. These units were clean closed by the facility and certified by the OEPA.
Group C	SWMU # 6 - Ponds 6E and 6W SWMU # 9 - Pond 10 SWMU # 19 - Former Drum Storage Area	These SWMUs are grouped together due to the proximity and overlapping of the units. The former ponds were associated with each other in the facility's historical record. As for the former drum storage pad, this unit overlaps each of the ponds.
Group D	SWMU # 12 - North Landfarm SWMU # 13 - East Landfarm SWMU # 14 - South Landfarm	These SWMUs are grouped together due to the similar manner that they were utilized during operation.
Group E	SWMU # 50 - Injection Well 1A SWMU # 51 - Injection Well 1 SWMU # 52 - Injection Well 3	These SWMUs are grouped together due to the similar manner that they were utilized during operation.
Group F (continued on next page)	SWMU # 31 - Filtered Acid Tank (FAT 2) SWMU # 32 - Pumphouse 2 SWMU # 33 - FAT 6 SWMU # 34 - Pumphouse 6 SWMU # 35 - FAT 5 SWMU # 36 - Pumphouse 5	These SWMUs are grouped together due to the similar manner that they were utilized during operation.

TABLE 4-1
SUMMARY OF SOLID WASTE MANAGEMENT UNITS / AREAS OF CONCERN
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

SWMU Group/Area of Concern	SWMU's/Titles	Rationale for Grouping
Group F (continued from previous page)	SWMU # 37 - FAT 4 SWMU # 38 - Pumphouse 4 SWMU # 39 - Old FAT 2 SWMU # 40 - Former Pumphouse 2	
Group G	SWMU # 21 – Truck Unloading Building SWMU # 22 – Sand Interceptors SWMU # 23 - V-Tanks SWMU # 24 – Caustic Gas Scrubber SWMU # 25 - T-Tanks SWMU # 26 - T-Tank Pumphouse SWMU # 27 – Leaf Filter Press SWMU # 29 – Filter Press Building SWMU # 30 - FAT A and B	These SWMUs are grouped together due to their interaction with each other during the treatment process
Group H	SWMU # 46 – Injection Well 2 SWMU # 47 – Injection Well 4 SWMU # 48 – Injection Well 5 SWMU # 49 – Injection Well 6	These SWMUs are grouped together due to the similar manner of operation.
Group I	SWMU # 15 - Oil Reclamation Facility SWMU # 18 – Former W-Tanks SWMU # 20 – Lab Waste Tank SWMU # 28 - Sluice Pit SWMU # 41 – PCB Storage Area SWMU # 42 – Maintenance Waste Oil Tanks (Closed) SWMU # 43 - Sanitary Wastewater Treatment Plant SWMU # 44 - Truck Unloading Facility Sewage Holding Tank SWMU # 45 – Maintenance Building Sewage Holding Tank	These SWMUs have been grouped together due to their independent operation during facility operations. Each unit will be sampled separately with independent analytical requirements.
Area of Concern A (AOC A)	Emergency Drain Tanks	N/A

TABLE 4-1
SUMMARY OF SOLID WASTE MANAGEMENT UNITS / AREAS OF CONCERN
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

SWMU Group/Area of Concern	SWMU's/Titles	Rationale for Grouping
Area of Concern B (AOC B)	North Parking Lot-Truck Unloading Facility	N/A
Area of Concern C (AOC C)	Former Pug Mill Staging Area	N/A
Area of Concern D (AOC D)	Borrow Pit #1	N/A
Area of Concern E (AOC E)	Borrow Pit #2	N/A
Area of Concern F (AOC F)	Truck Sampling Area, Inspection Bay Collection Tank, and Old Truck Scale	N/A
Area of Concern G (AOC G)	Roll-Off Staging Pad	N/A
Area of Concern H (AOC H)	Facility Aboveground Transfer Piping	N/A
Area of Concern I (AOC I)	Remaining Underground Piping	N/A
Monitoring Wells and Capillary Drain	N/A	N/A

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TABLE 4-2
40 CFR PART 264
APPENDIX IX HAZARDOUS CONSTITUENT PARAMETER LIST
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Metals and Inorganics Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Mercury Nickel Selenium Silver Thallium Tin Vanadium Zinc Chloride Percent Solids Sulfide Total Cyanide	Organochloride Pesticides 4,4'-DDD 4,4'-DDE 4,4'-DDT Aldrin alpha-BHC beta-BHC Chlordane delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor epoxide Hexachlorophene Kepone Lindane (gamma-BHC) Methoxychlor Toxaphene
Polychlorinated Dibenzo-P-Dioxins & Dibenzo Furans 2,3,7,8-TCDD Hexachlorodibenzo-p-dioxins Hexachlorodibenzo-p-furans Pentachlorodibenzo-p-dioxins Pentachlorodibenzo-p-furans Tetrachlorodibenzo-p-dioxins Tetrachlorodibenzo-p-furans	Organophosphate Pesticides Disulfoton Famphur Parathion Ethyl Parathion Methyl Phorate
Organochlorine Herbicides 2,4,5-T 2,4,5-TP (Silvex) 2,4-D Dinoseb	Polychlorinated biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260

TABLE 4-2
40 CFR PART 264
APPENDIX IX HAZARDOUS CONSTITUENT PARAMETER LIST
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Semi-volatile Organic Compounds	Semi-volatile Organic Compounds
1,2,4,5-Tetrachlorobenzene	Acenaphthylene
1,2,4-Trichlorobenzene	Acetophenone
1,2-Dichlorobenzene	Aniline
1,3,5-Trinitrobenzene	Anthracene
1,3-Dichlorobenzene	Aramite
1,3-Dinitrobenzene	Benzo[a]anthracene
1,4-Naphthoquinone	Benzo[a]pyrene
1,4-Phenylenediamine	Benzo[b]fluoranthene
1-Naphthylamine	Benzo[g,h,i]perylene
2,3,4,6-Tetrachlorophenol	Benzo[k]fluoranthene
2,4,5-Trichlorophenol	Benzyl alcohol
2,4,6-Trichlorophenol	bis(2-Chloroethoxy)methane
2,4-Dichlorophenol	bis(2-Chloroethyl)ether
2,4-Dimethylphenol	bis(2-Chloroisopropyl) ether
2,4-Dinitrophenol	bis(2-Ethylhexyl)phthalate
2,4-Dinitrotoluene	Butylbenzylphthalate
2,6-Dichlorophenol	Chlorobenzilate
2,6-Dinitrotoluene	Chrysene
2-Acetylamino Fluorene	Diallate
2-Chloronaphthalene	Dibenz[a,h]anthracene
2-Chlorophenol	Dibenzofuran
2-Methylnaphthalene	Diethylphthalate
2-Methylphenol	Hexachlorobutadiene
2-Naphthylamine	Hexachlorocyclopentadiene
2-Nitroaniline	Hexachloroethane
2-Nitrophenol	Hexachloropropene
2-Picoline	Indeno[1,2,3-cd]pyrene
3,3'-Dichlorobenzidine	Isodrin
3,3'-Dimethylbenzidine	Isophorone
3+4-Methylphenol	Isosafrole
3-Methylcholanthrene	Methapyrilene
3-Nitroaniline	Methyl methanesulfonate
4,6-Dinitro-2-methylphenol	Naphthalene
4-Aminobiphenyl	Nitrobenzene
4-Bromophenyl-phenylether	N-Nitrosodiethylamine
4-Chloro-3-methylphenol	N-Nitrosodimethylamine
4-Chloroaniline	N-Nitroso-di-n-butylamine
4-Chlorophenyl-phenylether	N-Nitroso-di-n-propylamine
4-Nitroaniline	N-nitrosodiphenylamine
4-Nitrophenol	N-Nitrosomorpholine
4-Nitroquinoline-1-oxide	N-Nitroso-n-methylethylamine
5-Nitro-o-Toluidine	N-Nitrosopiperidine
7,12-Dimethylbenz(a)anthracene	N-Nitrosopyrrolidine
a,a-Dimethylphenethylamine	o,o,o-triethylphosphorothioate
Acenaphthene	o-Toluidine

TABLE 4-2
40 CFR PART 264
APPENDIX IX HAZARDOUS CONSTITUENT PARAMETER LIST
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Semi-volatile Organic Compounds	Volatile Organic Compounds
p-Dimethylaminoazobenzene	Allyl Chloride
Pentachlorobenzene	Benzene
Pentachloronitrobenzene	Bromodichloromethane
Pentachlorophenol	Bromoform
Phenacetin	Bromomethane
Phenanthrene	Carbon Disulfide
Phenol	Carbon tetrachloride
Pronamide	Chlorobenzene
Pyrene	Chloroethane
Pyridine	Chloroform
Safrole	Chloromethane
Tetraethyl dithiopyrophosphate	cis-1,3-Dichloropropene
Thionazine	Dibromochloromethane
	Dibromomethane
	Dichlorodifluoromethane
	Ethyl methacrylate
	Ethylbenzene
	Isobutyl Alcohol
	Methacrylonitrile
	Methyl Iodide
	Methyl Methacrylate
	Methylene chloride
	Pentachloroethane
	Propionitrile
	Styrene
	Tetrachloroethene
	Toluene
	trans-1,2-Dichloroethene
	trans-1,3-Dichloropropene
	trans-1,4-Dichloro-2-butene
	Trichloroethene
	Trichlorofluoromethane
	Vinyl Acetate
	Vinyl chloride
	Xylene (total)

Volatile Organic Compounds
1,1,1,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2,3-Trichloropropane
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-Dichloroethane
1,2-Dichloropropane
1,4-Dichlorobenzene
1,4-Dioxane
2-Butanone
2-Chloro-1,3-butadiene
2-Hexanone
4-Methyl-2-pentanone
Acetone
Acetonitrile
Acrolein
Acrylonitrile

TABLE 4-3
WASTE MANAGEMENT OF OHIO-VICKERY
ANALYTICAL METHODS, HOLDING TIMES, AND PRESERVATION METHODS

Parameter	Method	Media ¹	Container	Preservation	Maximum Holding Time ²
Volatile Organics	8260B	Water	40 ml VOA Vials with Teflon® lined septum	4 drops HCL, Cool to 4°C	14 days
		Soil	EnCore® sample devices	Cool to 4°C	2days/14 days ⁶
Semi-Volatiles	8270B	Water	1 L amber glass with Teflon® liner	Cool to 4°C	47 days ³
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	54 days ⁴
Organophosphorus Pesticides	8141A	Water	1 L amber glass with Teflon liner	Cool to 4°C	47 days ³
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	54 days ⁴
PCBs, Organochlorine Pesticides	8081	Water	1 L amber glass with Teflon® liner	Cool to 4°C	47 days ³
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	54 days ⁴
Metals ⁵	6010B/7470A ⁵	Water	500ml polyethylene with polyethylene liner	50% HNO ₃ , pH <2. Cool to 4°C	6 months
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	6 months
Herbicides	8151A	Water	1 L amber glass with Teflon® liner	Cool to 4°C	47 days ³
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	54 days ⁴
Cyanide	9010A	Water	500 ml polyethylene with polyethylene liner	NaOH. pH > 12. Cool to 4°C	14 days
		Soil	8 oz. Wide mouth glass with Teflon® liner	Cool to 4°C	6 months
Sulfide	MCAWW 376.1	Water	500 ml polyethylene with polyethylene liner	Zinc Acetate, Cool to 4°C	7 days
		Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	6 months
PCDD, PCDF	8280	Soil	8 oz. wide mouth glass with Teflon® liner	Cool to 4°C	54 days ⁴
		Water	1 L narrow-mouth amber glass with Teflon® liner	Cool to 4°C	47 days ³
Geotechnical Parameters	ASTM ⁷	Soil	4 oz. wide mouth glass with Teflon® liner, polyethylene bag	Cool to 4°C	45 days

Notes:

1. Water refers to subsurface water (groundwater, capillary drain discharge) or surface water samples. Soil refers to samples from test pits, soil borings, and streambed sediments.
2. Holding time refers to the number of days following the Validated Time of Sample collection by the laboratory.
3. Seven days until extraction and analysis within 40 days of extraction. Fourteen days until extraction and analysis within 40 days of extraction. For PCDD/PCDF, 30 days until extraction and analysis within 40 days of extraction. Mercury has a holding time of 28 days for both liquid and soil samples. Liquid samples were preserved with 50% nitric acid.
6. Two days for preparation, 14 days for analysis.
7. Geotechnical testing included: cation exchange capacity, Atterberg Limits, moisture content, grain size distribution, soil pH, and total organic carbon (loss on ignition).

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	1746-01-6	2,3,7,8-TCDD	DIOXIN	<0.6	ng/l	BQL	0.6			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	HXCDD	Hexachlorodibenzo-p-dioxins	DIOXIN	<0.6	ng/l	BQL	0.6			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	HXCDF	Hexachlorodibenzo-p-furans	DIOXIN	<0.4	ng/l	BQL	0.4			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	PCDD	Pentachlorodibenzo-p-dioxins	DIOXIN	<0.9	ng/l	BQL	0.9			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	PCDF	Pentachlorodibenzo-p-furans	DIOXIN	<0.6	ng/l	BQL	0.6			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	TCDD	Tetrachlorodibenzo-p-dioxins	DIOXIN	<0.6	ng/l	BQL	0.6			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	TCDF	Tetrachlorodibenzo-p-furans	DIOXIN	<0.6	ng/l	BQL	0.6			9903047-01O
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	93-76-5	2,4,5-T	HERB	<0.11	ug/l	BQL	0.11			9903047-01I
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	93-72-1	2,4,5-TP (Silvex)	HERB	<0.11	ug/l	BQL	0.11			9903047-01I
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	94-75-7	2,4-D	HERB	<1.1	ug/l	BQL	1.1			9903047-01I
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	88-85-7	Dinoseb	HERB	<0.74	ug/l	BQL	0.74			9903047-01I
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-36-0	Antimony	INORG	<2.5	ug/l	BQL	2.5			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-38-2	Arsenic	INORG	<2.3	ug/l	BQL	2.3			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-39-3	Barium	INORG	6.2	ug/l		1.2	B		9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-41-7	Beryllium	INORG	<0.3	ug/l	BQL	0.3			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-43-9	Cadmium	INORG	<0.6	ug/l	BQL	0.6			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-47-3	Chromium	INORG	1.7	ug/l		0.6	B		9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-48-4	Cobalt	INORG	<0.9	ug/l	BQL	0.9			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-50-8	Copper	INORG	6.3	ug/l		1.8	B		9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7439-92-1	Lead	INORG	1.6	ug/l		1.4	B		9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7439-97-6	Mercury	INORG	<0.2	ug/l	BQL	0.2			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-02-0	Nickel	INORG	<1.4	ug/l	BQL	1.4			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7782-49-2	Selenium	INORG	<2.3	ug/l	BQL	2.3			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-22-4	Silver	INORG	<0.6	ug/l	BQL	0.6			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-28-0	Thallium	INORG	<3.5	ug/l	BQL	3.5			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-31-5	Tin	INORG	<5.6	ug/l	BQL	5.6			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-62-2	Vanadium	INORG	1.2	ug/l		0.7	B		9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7440-66-6	Zinc	INORG	21.2	ug/l		11.6			9903047-01L
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	298-04-4	Disulfoton	OPPEST	<0.7	ug/l	BQL	0.7			9903047-01G
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	52-85-7	Famphur	OPPEST	<20	ug/l	BQL	20		J	9903047-01G
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	56-38-2	Parathion Ethyl	OPPEST	<0.61	ug/l	BQL	0.61		J	9903047-01G
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	298-00-0	Parathion Methyl	OPPEST	<1.2	ug/l	BQL	1.2		J	9903047-01G
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	298-02-2	Phorate	OPPEST	<0.4	ug/l	BQL	0.4			9903047-01G
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	12674-11-2	Aroclor 1016	PCB	<0.53	ug/l	BQL	0.53			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	11104-28-2	Aroclor 1221	PCB	<0.53	ug/l	BQL	0.53			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	11141-16-5	Aroclor 1232	PCB	<0.53	ug/l	BQL	0.53			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	53469-21-9	Aroclor 1242	PCB	<0.68	ug/l	BQL	0.68			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	12672-29-6	Aroclor 1248	PCB	<1.1	ug/l	BQL	1.1			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	11097-69-1	Aroclor 1254	PCB	<1.1	ug/l	BQL	1.1			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	11096-82-5	Aroclor 1260	PCB	<1.1	ug/l	BQL	1.1			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	72-54-8	4,4'-DDD	PEST	<0.12	ug/l	BQL	0.12			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	72-55-9	4,4'-DDE	PEST	<0.042	ug/l	BQL	0.042			9903047-01J

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	50-29-3	4,4'-DDT	PEST	<0.042	ug/l	BQL	0.042			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	309-00-2	Aldrin	PEST	<0.042	ug/l	BQL	0.042		J	9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	319-84-6	alpha-BHC	PEST	<0.032	ug/l	BQL	0.032			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	319-85-7	beta-BHC	PEST	<0.063	ug/l	BQL	0.063			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	57-74-9	Chlordane	PEST	<0.15	ug/l	BQL	0.15			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	319-86-8	delta-BHC	PEST	<0.095	ug/l	BQL	0.095		J	9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	60-57-1	Dieldrin	PEST	<0.005	ug/l	BQL	0.005			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	959-98-8	Endosulfan I	PEST	<0.15	ug/l	BQL	0.15			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	33213-65-9	Endosulfan II	PEST	<0.042	ug/l	BQL	0.042			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	1031-07-8	Endosulfan sulfate	PEST	<0.69	ug/l	BQL	0.69		J	9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	72-20-8	Endrin	PEST	<0.063	ug/l	BQL	0.063			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7421-93-4	Endrin aldehyde	PEST	<0.24	ug/l	BQL	0.24			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	76-44-8	Heptachlor	PEST	<0.032	ug/l	BQL	0.032			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	1024-57-3	Heptachlor epoxide	PEST	<0.34	ug/l	BQL	0.34			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	70-30-4	Hexachlorophene	PEST	<53	ug/l	BQL	53			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	143-50-0	Kepone	PEST	<21	ug/l	BQL	21			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	58-89-9	Lindane (gamma-BHC)	PEST	<0.042	ug/l	BQL	0.042			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	72-43-5	Methoxychlor	PEST	<1.9	ug/l	BQL	1.9			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	8001-35-2	Toxaphene	PEST	<0.91	ug/l	BQL	0.91			9903047-01J
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-94-3	1,2,4,5-Tetrachlorobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	120-82-1	1,2,4-Trichlorobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-50-1	1,2-Dichlorobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	99-35-4	1,3,5-Trinitrobenzene	SVOC	<4	ug/l	BQL	4			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	541-73-1	1,3-Dichlorobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	99-65-0	1,3-Dinitrobenzene	SVOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	130-15-4	1,4-Naphthoquinone	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	106-50-3	1,4-Phenylenediamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	134-32-7	1-Naphthylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	58-90-2	2,3,4,6-Tetrachlorophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-95-4	2,4,5-Trichlorophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	88-06-2	2,4,6-Trichlorophenol	SVOC	<2	ug/l	BQL	2			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	120-83-2	2,4-Dichlorophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	105-67-9	2,4-Dimethylphenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	51-28-5	2,4-Dinitrophenol	SVOC	<53	ug/l	BQL	53			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	121-14-2	2,4-Dinitrotoluene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	87-65-0	2,6-Dichlorophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	606-20-2	2,6-Dinitrotoluene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	53-96-3	2-Acetylamino Fluorene	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-58-7	2-Chloronaphthalene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-57-8	2-Chlorophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-57-6	2-Methylnaphthalene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-48-7	2-Methylphenol	SVOC	<11	ug/l	BQL	11			9903047-01A

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-59-8	2-Naphthylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	99-09-2	2-Nitroaniline	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	88-75-5	2-Nitrophenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	109-06-8	2-Picoline	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-94-1	3,3'-Dichlorobenzidine	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	119-93-7	3,3'-Dimethylbenzidine	SVOC	<11	ug/l	BQL	11		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-39-4/106-44-5	3+4-Methylphenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	56-49-5	3-Methylcholanthrene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	88-74-4	3-Nitroaniline	SVOC	<53	ug/l	BQL	53		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	534-52-1	4,6-Dinitro-2-methylphenol	SVOC	<53	ug/l	BQL	53			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	92-67-1	4-Aminobiphenyl	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	101-55-3	4-Bromophenyl-phenylether	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	59-50-7	4-Chloro-3-methylphenol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	106-47-8	4-Chloroaniline	SVOC	<11	ug/l	BQL	11		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	7005-72-3	4-Chlorophenyl-phenylether	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-01-6	4-Nitroaniline	SVOC	<21	ug/l	BQL	21		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-02-7	4-Nitrophenol	SVOC	<53	ug/l	BQL	53			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	56-57-5	4-Nitroquinoline-1-oxide	SVOC	<42	ug/l	BQL	42		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	99-55-8	5-Nitro-o-Toluidine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	57-97-6	7,12-Dimethylbenz(a)anthracene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	122-09-8	a,a-Dimethylphenethylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	83-32-9	Acenaphthene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	208-96-8	Acenaphthylene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	98-86-2	Acetophenone	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	62-53-3	Aniline	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	120-12-7	Anthracene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	140-57-8	Aramite	SVOC	<5	ug/l	BQL	5		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	56-55-3	Benzo[a]anthracene	SVOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	50-32-8	Benzo[a]pyrene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	205-99-2	Benzo[b]fluoranthene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	191-24-2	Benzo[g,h,i]perylene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	207-08-9	Benzo[k]fluoranthene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-51-6	Benzyl alcohol	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	111-91-1	bis(2-Chloroethoxy)methane	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	111-44-4	bis(2-Chloroethyl)ether	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	39638-32-9	bis(2-Chloroisopropyl) ether	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	117-81-7	bis(2-Ethylhexyl)phthalate	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	85-68-7	Butylbenzylphthalate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	510-15-6	Chlorobenzilate	SVOC	<2	ug/l	BQL	2			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	218-01-9	Chrysene	SVOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	2303-16-4	Diallate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	53-70-3	Dibenz[a,h]anthracene	SVOC	<3	ug/l	BQL	3			9903047-01A

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	132-64-9	Dibenzofuran	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	84-66-2	Diethylphthalate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	60-51-5	Dimethoate	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	131-11-3	Dimethylphthalate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	84-74-2	di-n-Butylphthalate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	117-84-0	di-n-Octylphthalate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	122-39-4	Diphenylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	62-50-0	Ethyl methanesulfonate	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	206-44-0	Fluoranthene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	86-73-7	Fluorene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	118-74-1	Hexachlorobenzene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	87-68-3	Hexachlorobutadiene	SVOC	<3	ug/l	BQL	3			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	77-47-4	Hexachlorocyclopentadiene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	67-72-1	Hexachloroethane	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	1888-71-7	Hexachloropropene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	193-39-5	Indeno[1,2,3-cd]pyrene	SVOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	465-73-6	Isodrin	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	78-59-1	Isophorone	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	120-58-1	Isosafrole	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-80-5	Methapyrilene	SVOC	<110	ug/l	BQL	110			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	66-27-3	Methyl methanesulfonate	SVOC	<16	ug/l	BQL	16			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	91-20-3	Naphthalene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	98-95-3	Nitrobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	55-18-5	N-Nitrosodiethylamine	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	62-75-9	N-Nitrosodimethylamine	SVOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	924-16-3	N-Nitroso-di-n-butylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	621-64-7	N-Nitroso-di-n-propylamine	SVOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	86-30-6	N-nitrosodiphenylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	59-89-2	N-Nitrosomorpholine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	10595-95-6	N-Nitroso-n-methylethylamine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-75-4	N-Nitrosopiperidine	SVOC	<21	ug/l	BQL	21			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	930-55-2	N-Nitrosopyrrolidine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	126-68-1	o,o,o-triethylphosphorothioate	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	95-53-4	o-Toluidine	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	60-11-7	p-Dimethylaminioazobenzene	SVOC	<11	ug/l	BQL	11			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	608-93-5	Pentachlorobenzene	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	82-68-8	Pentachloronitrobenzene	SVOC	<20	ug/l	BQL	20			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	87-86-5	Pentachlorophenol	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	62-44-2	Phenacetin	SVOC	<20	ug/l	BQL	20			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	85-01-8	Phenanthrene	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-95-2	Phenol	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	23950-58-5	Pronamide	SVOC	<10	ug/l	BQL	10			9903047-01A

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	129-00-0	Pyrene	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	110-86-1	Pyridine	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	94-59-7	Safrole	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	3689-24-5	Tetraethyl dithiopyrophosphate	SVOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	297-97-2	Thionazine	SVOC	<20	ug/l	BQL	20			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	630-20-6	1,1,1,2-Tetrachloroethane	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	71-55-6	1,1,1-Trichloroethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	79-34-5	1,1,2,2-Tetrachloroethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	79-00-5	1,1,2-Trichloroethane	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-34-3	1,1-Dichloroethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-35-4	1,1-Dichloroethene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	96-18-4	1,2,3-Trichloropropane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	96-12-8	1,2-Dibromo-3-chloropropane	VOC	<1	ug/l	BQL	1		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	106-93-4	1,2-Dibromoethane	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	107-06-2	1,2-Dichloroethane	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	78-87-5	1,2-Dichloropropane	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	106-46-7	1,4-Dichlorobenzene	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	123-91-1	1,4-Dioxane	VOC	<20	ug/l	BQL	20		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	78-93-3	2-Butanone	VOC	<10	ug/l	BQL	10		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	12-99-8	2-Chloro-1,3-butadiene	VOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	591-78-6	2-Hexanone	VOC	<10	ug/l	BQL	10		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-10-1	4-Methyl-2-pentanone	VOC	<10	ug/l	BQL	10		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	67-64-1	Acetone	VOC	<10	ug/l	BQL	10		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-05-8	Acetonitrile	VOC	<100	ug/l	BQL	100		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	107-02-8	Acrolein	VOC	<20	ug/l	BQL	20		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	107-13-1	Acrylonitrile	VOC	<20	ug/l	BQL	20		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	107-18-6	Allyl Chloride	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	71-43-2	Benzene	VOC	<0.5	ug/l	BQL	0.5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-27-4	Bromodichloromethane	VOC	5	ug/l		5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-25-2	Bromoform	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	74-83-9	Bromomethane	VOC	<2	ug/l	BQL	2		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-15-0	Carbon Disulfide	VOC	<5	ug/l	BQL	5		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	56-23-5	Carbon tetrachloride	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-90-7	Chlorobenzene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-00-3	Chloroethane	VOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	67-66-3	Chloroform	VOC	25.8	ug/l		1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	74-87-3	Chloromethane	VOC	<10	ug/l	BQL	10			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	10061-01-5	cis-1,3-Dichloropropene	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	124-48-1	Dibromochloromethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	74-95-3	Dibromomethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-71-8	Dichlorodifluoromethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	97-63-2	Ethyl methacrylate	VOC	<5	ug/l	BQL	5			9903047-01A

TABLE 4-4
CLYDE WATER SUPPLY SAMPLING RESULTS SUMMARY
(DECONTAMINATION WATER)
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Sample Date	Sample Matrix	CAS Number	CAS Analyte Name	CAS Analyte Group	Result	Unit	Result Modifier	Reportin Limit	Lab Flag	Q Flag	Lab Sample ID
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-41-4	Ethylbenzene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	78-83-1	Isobutyl Alcohol	VOC	<50	ug/l	BQL	50		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	126-98-7	Methacrylonitrile	VOC	<5	ug/l	BQL	5		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	74-88-4	Methyl Iodide	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	80-62-6	Methyl Methacrylate	VOC	<5	ug/l	BQL	5		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-09-2	Methylene chloride	VOC	<1	ug/l	BQL	1		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	76-01-7	Pentachloroethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	107-12-0	Propionitrile	VOC	<50	ug/l	BQL	50		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	100-42-5	Styrene	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	127-18-4	Tetrachloroethene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-88-3	Toluene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	156-60-5	trans-1,2-Dichloroethene	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	10061-02-6	trans-1,3-Dichloropropene	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	110-57-6	trans-1,4-Dichloro-2-butene	VOC	<100	ug/l	BQL	100			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	79-01-6	Trichloroethene	VOC	<1	ug/l	BQL	1			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-69-4	Trichlorofluoromethane	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	108-05-4	Vinyl Acetate	VOC	<10	ug/l	BQL	10		J	9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	75-01-4	Vinyl chloride	VOC	<2	ug/l	BQL	2			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	1330-20-7	Xylene (total)	VOC	<5	ug/l	BQL	5			9903047-01A
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	18496-25-8	Sulfide	WET	<1	mg/l	BQL	1		J	9903047-01M
CLYDE WATER SUPPLY ONSR510	03-Mar-99	RW	57-12-5	Total Cyanide	WET	<5	ug/l	BQL	5			9903047-01N

Notes:

1. Sample Matrix (RW) = Rinse water
2. Laboratory Qualifiers include:
BQL = Below Quantitation Limit
B = Indicates that the compound was found in the associated blank
3. Data Validation Qualifiers include:
J = Estimated due to failed QC criteria

**TABLE 5-1
PROJECT STANDARDS
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

CAS Analyte Group	CAS Analyte Number	CAS Analyte Name	EPA Region 9 Industrial PRG Concentration (Soil)	PRG Unit	EPA Ecotox Thresholds Concentration (Sediment)	Ecotox Unit	EPA Region 5 DQL Concentration (Water)	DQL Unit	Average Background Inorganics	Bkg Unit	EPA Region 5 Ecological DQL Concentration (Sediment)	Eco DQL Unit	EPA Region 5 Ecological DQL Concentration (Soil)	Eco DQL Unit
DIOXIN	1746-01-6	2,3,7,8-TCDD					0.00045 ng/l							
DIOXIN	HXCDD	Hexachlorodibenzo-p-dioxins												
DIOXIN	HXCDF	Hexachlorodibenzo-p-furans												
DIOXIN	PCDD	Pentachlorodibenzo-p-dioxins												
DIOXIN	PCDF	Pentachlorodibenzo-p-furans												
DIOXIN	TCDD	Tetrachlorodibenzo-p-dioxins												
DIOXIN	TCDF	Tetrachlorodibenzo-p-furans												
HERB	93-76-5	2,4,5-T	10,688,680. ug/kg				370. ug/l				58,700. ug/kg		596.34 ug/kg	
HERB	93-72-1	2,4,5-TP (Silvex)	8,550,940. ug/kg				290. ug/l				7,350. ug/kg		108.8 ug/kg	
HERB	94-75-7	2,4-D	14,035,530. ug/kg				370. ug/l				5.79 ug/kg		27.25 ug/kg	
HERB	88-85-7	Dinoseb	1,068,870. ug/kg				37. ug/l				11.78 ug/kg		21.8 ug/kg	
INORG	7440-36-0	Antimony	749.27 mg/kg				15. ug/l		0.67 mg/kg				0.1423 mg/kg	
INORG	7440-38-2	Arsenic	2.99 mg/kg				0.038 ug/l		9.74 mg/kg		5.9 mg/kg		5.7 mg/kg	
INORG	7440-39-3	Barium	100,000. mg/kg				2,600. ug/l		103.05 mg/kg				1.04 mg/kg	
INORG	7440-41-7	Beryllium	3,400. mg/kg				0.016 ug/l		1 mg/kg				1.06 mg/kg	
INORG	7440-43-9	Cadmium	934.3 mg/kg		1.2 mg/kg		18. ug/l		0.94 mg/kg		0.596 mg/kg		0.00222 mg/kg	
INORG	7440-47-3	Chromium	64.05 mg/kg				180. ug/l		28.34 mg/kg		26. mg/kg		0.4 mg/kg	
INORG	7440-48-4	Cobalt	28,620.2 mg/kg						10.22 mg/kg		50. mg/kg		0.14033 mg/kg	
INORG	7440-50-8	Copper	69,569.94 mg/kg		34. mg/kg		1,400. ug/l		25.19 mg/kg		16. mg/kg		0.3132 mg/kg	
INORG	7439-92-1	Lead	1,000. mg/kg		47. mg/kg		4. ug/l		14.14 mg/kg		31. mg/kg		0.05373 mg/kg	
INORG	7439-97-6	Mercury	510. mg/kg		0.15 mg/kg		11. ug/l		0.032 mg/kg		0.174 mg/kg		0.1 mg/kg	
INORG	7440-02-0	Nickel	37,461.94 mg/kg		21. mg/kg		730. ug/l		29.55 mg/kg		16. mg/kg		13.6 mg/kg	
INORG	7782-49-2	Selenium	9,365.75 mg/kg				180. ug/l		0.97 mg/kg				0.02765 mg/kg	
INORG	7440-22-4	Silver	9,365.75 mg/kg				180. ug/l		0.2 mg/kg		0.5 mg/kg		4.04 mg/kg	
INORG	7440-28-0	Thallium	120. mg/kg				2.9 ug/l		1.1 mg/kg				0.05692 mg/kg	
INORG	7440-31-5	Tin	100,000. mg/kg				22,000. ug/l		1.18 mg/kg				7.62 mg/kg	
INORG	7440-62-2	Vanadium	13,112. mg/kg				260. ug/l		42.48 mg/kg				1.59 mg/kg	
INORG	7440-66-6	Zinc	100,000. mg/kg				11,000. ug/l		78.05 mg/kg		120. mg/kg		6.62 mg/kg	
OPPEST	298-04-4	Disulfoton	42,750. ug/kg				1.5 ug/l				324.08 ug/kg		19.88 ug/kg	
OPPEST	52-85-7	Famphur									1.78 ug/kg		49.7 ug/kg	
OPPEST	56-38-2	Parathion Ethyl	6,413,210. ug/kg				229. ug/l				0.34 ug/kg		0.34 ug/kg	
OPPEST	298-00-0	Parathion Methyl	267,220. ug/kg				9.1 ug/l				0.755 ug/kg		0.292 ug/kg	
OPPEST	298-02-2	Phorate	213,770. ug/kg				7.3 ug/l				0.861 ug/kg		0.496 ug/kg	
PCB	12674-11-2	Aroclor 1016	62,830. ug/kg											
PCB	11104-28-2	Aroclor 1221												
PCB	11141-16-5	Aroclor 1232												
PCB	53469-21-9	Aroclor 1242												
PCB	12672-29-6	Aroclor 1248												
PCB	11097-69-1	Aroclor 1254	17,950. ug/kg											
PCB	11096-82-5	Aroclor 1260			23. ug/kg									
PEST	72-54-8	4,4'-DDD	18,720. ug/kg				0.28 ug/l				5.53 ug/kg		758.15 ug/kg	
PEST	72-55-9	4,4'-DDE	13,210. ug/kg				0.2 ug/l				1.42 ug/kg		595.87 ug/kg	
PEST	50-29-3	4,4'-DDT	13,210. ug/kg		1.6 ug/kg		0.2 ug/l				1.19 ug/kg		17.5 ug/kg	
PEST	309-00-2	Aldrin	180. ug/kg				0.004 ug/l							
PEST	319-84-6	alpha-BHC	670. ug/kg				0.011 ug/l				6. ug/kg		99.39 ug/kg	
PEST	319-85-7	beta-BHC	2,330. ug/kg				0.037 ug/l				5. ug/kg		3.98 ug/kg	
PEST	57-74-9	Chlordane	11,980. ug/kg				0.052 ug/l				4.5 ug/kg		224. ug/kg	
PEST	319-86-8	delta-BHC									71,500. ug/kg		9,940. ug/kg	

**TABLE 5-1
PROJECT STANDARDS
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

CAS Analyte Group	CAS Analyte Number	CAS Analyte Name	EPA Region 9 Industrial PRG Concentration (Soil)	PRG Unit	EPA Ecotox Thresholds Concentration (Sediment)	Ecotox Unit	EPA Region 5 DQL Concentration (Water)	DQL Unit	Average Background Inorganics	Bkg Unit	EPA Region 5 Ecological DQL Concentration (Sediment)	Eco DQL Unit	EPA Region 5 Ecological DQL Concentration (Soil)	Eco DQL Unit
PEST	60-57-1	Dieldrin	190. ug/kg		52. ug/kg		0.0042 ug/l				2. ug/kg		2.38 ug/kg	
PEST	959-98-8	Endosulfan I	4,100,000. ug/kg		2.9 ug/kg		1.8 ug/l				0.175 ug/kg		119.27 ug/kg	
PEST	33213-65-9	Endosulfan II	4,100,000. ug/kg		14. ug/kg		1.8 ug/l				0.104 ug/kg		119.27 ug/kg	
PEST	1031-07-8	Endosulfan sulfate									34.6 ug/kg		35.78 ug/kg	
PEST	72-20-8	Endrin	320,660. ug/kg		20. ug/kg		11. ug/l				2.67 ug/kg		10.1 ug/kg	
PEST	7421-93-4	Endrin aldehyde									3,200. ug/kg		10.5 ug/kg	
PEST	76-44-8	Heptachlor	670. ug/kg				0.015 ug/l				0.6 ug/kg		5.98 ug/kg	
PEST	1024-57-3	Heptachlor epoxide	330. ug/kg				0.0074 ug/l				0.6 ug/kg		151.88 ug/kg	
PEST	70-30-4	Hexachlorophene	320,660. ug/kg				11. ug/l				231,000. ug/kg		198.78 ug/kg	
PEST	143-50-0	Kepone	170. ug/kg				0.0037 ug/l				3.31 ug/kg		32.72 ug/kg	
PEST	58-89-9	Lindane (gamma-BHC)	3,230. ug/kg		3.7 ug/kg		0.052 ug/l				0.94 ug/kg		5. ug/kg	
PEST	72-43-5	Methoxychlor	5,344,340. ug/kg		19. ug/kg		180. ug/l				3.59 ug/kg		19.88 ug/kg	
PEST	8001-35-2	Toxaphene	2,720. ug/kg		28. ug/kg		0.061 ug/l				0.109 ug/kg		119.27 ug/kg	
SVOC	95-94-3	1,2,4,5-Tetrachlorobenzene	320,660. ug/kg				11. ug/l				20,900. ug/kg		2,020. ug/kg	
SVOC	120-82-1	1,2,4-Trichlorobenzene	1,700,000. ug/kg		9,200. ug/kg		190. ug/l				11,700. ug/kg		11,100. ug/kg	
SVOC	95-50-1	1,2-Dichlorobenzene	370,000. ug/kg		340. ug/kg		370. ug/l				231.32 ug/kg		2,960. ug/kg	
SVOC	99-35-4	1,3,5-Trinitrobenzene	32,066,030. ug/kg				1.8 ug/l				0.121 ug/kg		376.15 ug/kg	
SVOC	541-73-1	1,3-Dichlorobenzene	135,520. ug/kg		1,700. ug/kg						3,010. ug/kg		37,700. ug/kg	
SVOC	99-65-0	1,3-Dinitrobenzene	106,890. ug/kg				3.7 ug/l				0.924 ug/kg		654.7 ug/kg	
SVOC	130-15-4	1,4-Naphthoquinone									0.0211 ug/kg		1,670. ug/kg	
SVOC	106-50-3	1,4-Phenylenediamine	100,000,000. ug/kg				6,900. ug/l				0.00568 ug/kg		6,160. ug/kg	
SVOC	134-32-7	1-Naphthylamine									1.09 ug/kg		9,340. ug/kg	
SVOC	58-90-2	2,3,4,6-Tetrachlorophenol	32,066,030. ug/kg				1,100. ug/l				1,510. ug/kg		198.78 ug/kg	
SVOC	95-95-4	2,4,5-Trichlorophenol	106,886,770. ug/kg				3,700. ug/l				85.56 ug/kg		14,100. ug/kg	
SVOC	88-06-2	2,4,6-Trichlorophenol	272,080. ug/kg				6.1 ug/l				84.84 ug/kg		9,940. ug/kg	
SVOC	120-83-2	2,4-Dichlorophenol	3,206,600. ug/kg				110. ug/l				133.63 ug/kg		87,500. ug/kg	
SVOC	105-67-9	2,4-Dimethylphenol	21,377,350. ug/kg				730. ug/l				304.53 ug/kg		10. ug/kg	
SVOC	51-28-5	2,4-Dinitrophenol	2,137,740. ug/kg				73. ug/l				1.33 ug/kg		60.86 ug/kg	
SVOC	121-14-2	2,4-Dinitrotoluene	2,137,740. ug/kg				73. ug/l				75.13 ug/kg		1,280. ug/kg	
SVOC	87-65-0	2,6-Dichlorophenol									3.94 ug/kg		1,170. ug/kg	
SVOC	606-20-2	2,6-Dinitrotoluene	1,068,870. ug/kg				37. ug/l				20.62 ug/kg		32.83 ug/kg	
SVOC	53-96-3	2-Acetylaminofluorene												
SVOC	91-58-7	2-Chloronaphthalene	23,681,280. ug/kg				2,900. ug/l				417.23 ug/kg		12.18 ug/kg	
SVOC	95-57-8	2-Chlorophenol	236,250. ug/kg				180. ug/l				11.7 ug/kg		242.66 ug/kg	
SVOC	91-57-6	2-Methylnaphthalene									20.2 ug/kg		3,240. ug/kg	
SVOC	95-48-7	2-Methylphenol	53,443,390. ug/kg				1,800. ug/l				0.826 ug/kg		40,400. ug/kg	
SVOC	91-59-8	2-Naphthylamine									1.74 ug/kg		3,030. ug/kg	
SVOC	99-09-2	2-Nitroaniline					2.2 ug/l				0.222 ug/kg		3,160. ug/kg	
SVOC	88-75-5	2-Nitrophenol									7.77 ug/kg		1,600. ug/kg	
SVOC	109-06-8	2-Picoline									753.05 ug/kg		9,900. ug/kg	
SVOC	91-94-1	3,3'-Dichlorobenzidine	6,650. ug/kg				0.15 ug/l				28.22 ug/kg		646.36 ug/kg	
SVOC	119-93-7	3,3'-Dimethylbenzidine	330. ug/kg				0.0073 ug/l				2. ug/kg		104.2 ug/kg	
SVOC	108-39-4/106-	3+4-Methylphenol	3,400,000. ug/kg				180. ug/l				0.808 ug/kg		3,490. ug/kg	
SVOC	56-49-5	3-Methylcholanthrene									8,190,000. ug/kg		77.94 ug/kg	
SVOC	88-74-4	3-Nitroaniline	64,130. ug/kg								0.222 ug/kg		74,100. ug/kg	
SVOC	534-52-1	4,6-Dinitro-2-methylphenol									10.38 ug/kg		144.08 ug/kg	
SVOC	92-67-1	4-Aminobiphenyl									5.66 ug/kg		3.05 ug/kg	
SVOC	101-55-3	4-Bromophenyl-phenylether									1,550. ug/kg			

**TABLE 5-1
PROJECT STANDARDS
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

CAS Analyte Group	CAS Analyte Number	CAS Analyte Name	EPA Region 9 Industrial PRG Concentration (Soil)	PRG Unit	EPA Ecotox Thresholds Concentration (Sediment)	Ecotox Unit	EPA Region 5 DQL Concentration (Water)	DQL Unit	Average Background Inorganics	Bkg Unit	EPA Region 5 Ecological DQL Concentration (Sediment)	Eco DQL Unit	EPA Region 5 Ecological DQL Concentration (Soil)	Eco DQL Unit
SVOC	59-50-7	4-Chloro-3-methylphenol									388.18 ug/kg		7,950. ug/kg	
SVOC	106-47-8	4-Chloroaniline	4,275,470. ug/kg				150. ug/l				146.08 ug/kg		1,100. ug/kg	
SVOC	7005-72-3	4-Chlorophenyl-phenylether									656.12 ug/kg			
SVOC	100-01-6	4-Nitroaniline									0.222 ug/kg		21,900. ug/kg	
SVOC	100-02-7	4-Nitrophenol	66,269,800. ug/kg								7.78 ug/kg		5,120. ug/kg	
SVOC	56-57-5	4-Nitroquinoline-1-oxide									1.24 ug/kg		122.22 ug/kg	
SVOC	99-55-8	5-Nitro-o-Toluidine	90,690. ug/kg								0.845 ug/kg		8,730. ug/kg	
SVOC	57-97-6	7,12-Dimethylbenz(a)anthracene									66,400. ug/kg		16,300. ug/kg	
SVOC	122-09-8	a,a-Dimethylphenethylamine	1,068,870. ug/kg								890. ug/kg		300.16 ug/kg	
SVOC	83-32-9	Acenaphthene	27,982,760. ug/kg		620. ug/kg		370. ug/l							
SVOC	208-96-8	Acenaphthylene												
SVOC	98-86-2	Acetophenone	1,610. ug/kg				3,700. ug/l							
SVOC	62-53-3	Aniline	525,060. ug/kg				11. ug/l				0.0338 ug/kg		56.78 ug/kg	
SVOC	120-12-7	Anthracene	222,306,050. ug/kg				1,800. ug/l				46.9 ug/kg		1,480,000. ug/kg	
SVOC	140-57-8	Aramite	119,710. ug/kg				2.7 ug/l				0.00111 ug/kg		166,000. ug/kg	
SVOC	56-55-3	Benzo[a]anthracene	3,590. ug/kg				0.092 ug/l				31.7 ug/kg		5,210. ug/kg	
SVOC	50-32-8	Benzo[a]pyrene	360. ug/kg		430. ug/kg		0.0092 ug/l				31.9 ug/kg		1,520. ug/kg	
SVOC	205-99-2	Benzo[b]fluoranthene	3,590. ug/kg				0.092 ug/l				10,400. ug/kg		59,800. ug/kg	
SVOC	191-24-2	Benzo[g,h,i]perylene									170. ug/kg		119,000. ug/kg	
SVOC	207-08-9	Benzo[k]fluoranthene	35,870. ug/kg				0.92 ug/l				240. ug/kg		148,000. ug/kg	
SVOC	100-51-6	Benzyl alcohol	100,000,000. ug/kg				11,000. ug/l				33.94 ug/kg		65,800. ug/kg	
SVOC	111-91-1	bis(2-Chloroethoxy)methane									349.71 ug/kg		302.09 ug/kg	
SVOC	111-44-4	bis(2-Chloroethyl)ether	560. ug/kg				0.0098 ug/l				211.96 ug/kg		23,700. ug/kg	
SVOC	39638-32-9	bis(2-Chloroisopropyl) ether	7,410. ug/kg				0.96 ug/l							
SVOC	117-81-7	bis(2-Ethylhexyl)phthalate	213,770. ug/kg				4.8 ug/l							
SVOC	85-68-7	Butylbenzylphthalate	930,000. ug/kg				7,300. ug/l				4,190. ug/kg		238.89 ug/kg	
SVOC	510-15-6	Chlorobenzilate	11,080. ug/kg				0.25 ug/l				860.29 ug/kg		5,050. ug/kg	
SVOC	218-01-9	Chrysene	358,690. ug/kg				9.2 ug/l				57.1 ug/kg		4,730. ug/kg	
SVOC	2303-16-4	Diallate	49,060. ug/kg				1.1 ug/l				1.51 ug/kg		452.14 ug/kg	
SVOC	53-70-3	Dibenz[a,h]anthracene	360. ug/kg				0.0092 ug/l				6.22 ug/kg		18,400. ug/kg	
SVOC	132-64-9	Dibenzofuran	3,235,580. ug/kg		2,000. ug/kg		150. ug/l				1,520. ug/kg			
SVOC	84-66-2	Diethylphthalate	100,000,000. ug/kg		630. ug/kg		29,000. ug/l				8.04 ug/kg		24,800. ug/kg	
SVOC	60-51-5	Dimethoate	213,770. ug/kg				7.3 ug/l				190.15 ug/kg		218.02 ug/kg	
SVOC	131-11-3	Dimethylphthalate	100,000,000. ug/kg				370,000. ug/l				24.95 ug/kg		734,000. ug/kg	
SVOC	84-74-2	di-n-Butylphthalate	106,886,770. ug/kg				3,700. ug/l				110.5 ug/kg		149.79 ug/kg	
SVOC	117-84-0	di-n-Octylphthalate	10,000,000. ug/kg				730. ug/l				40,600. ug/kg		709,000. ug/kg	
SVOC	122-39-4	Diphenylamine	26,721,690. ug/kg				910. ug/l				34.6 ug/kg		1,010. ug/kg	
SVOC	62-50-0	Ethyl methanesulfonate									0.0161 ug/kg			
SVOC	206-44-0	Fluoranthene	37,403,290. ug/kg		2,900. ug/kg		1,500. ug/l				111.3 ug/kg		122,000. ug/kg	
SVOC	86-73-7	Fluorene	22,380,780. ug/kg		540. ug/kg		240. ug/l				21.2 ug/kg		122,000. ug/kg	
SVOC	118-74-1	Hexachlorobenzene	1,870. ug/kg				0.042 ug/l				20. ug/kg		198.78 ug/kg	
SVOC	87-68-3	Hexachlorobutadiene	38,370. ug/kg				0.86 ug/l				1,380. ug/kg		39.76 ug/kg	
SVOC	77-47-4	Hexachlorocyclopentadiene	7,088,840. ug/kg				260. ug/l				900.74 ug/kg		755.37 ug/kg	
SVOC	67-72-1	Hexachloroethane	213,770. ug/kg		1,000. ug/kg		4.8 ug/l				2,230. ug/kg		596.34 ug/kg	
SVOC	1888-71-7	Hexachloropropene									0.2 ug/kg			
SVOC	193-39-5	Indeno[1,2,3-cd]pyrene	3,590. ug/kg				0.092 ug/l				200. ug/kg		109,000. ug/kg	
SVOC	465-73-6	Isodrin									55.16 ug/kg		3.32 ug/kg	
SVOC	78-59-1	Isophorone	3,150,350. ug/kg				71. ug/l				422.3 ug/kg		139,000. ug/kg	

**TABLE 5-1
PROJECT STANDARDS
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

CAS Analyte Group	CAS Analyte Number	CAS Analyte Name	EPA Region 9 Industrial PRG Concentration (Soil)	PRG Unit	EPA Ecotox Thresholds Concentration (Sediment)	Ecotox Unit	EPA Region 5 DQL Concentration (Water)	DQL Unit	Average Background Inorganics	Bkg Unit	EPA Region 5 Ecological DQL Concentration (Sediment)	Eco DQL Unit	EPA Region 5 Ecological DQL Concentration (Soil)	Eco DQL Unit
SVOC	120-58-1	Isosafrole									4.12 ug/kg		9,940. ug/kg	
SVOC	91-80-5	Methapyrilene									0.0144 ug/kg		2,780. ug/kg	
SVOC	66-27-3	Methyl methanesulfonate									0.00474 ug/kg		315.49 ug/kg	
SVOC	91-20-3	Naphthalene	187,530. ug/kg		480. ug/kg		240. ug/l				34.6 ug/kg		99.39 ug/kg	
SVOC	98-95-3	Nitrobenzene	103,860. ug/kg				18. ug/l				487.6 ug/kg		1,310. ug/kg	
SVOC	55-18-5	N-Nitrosodiethylamine	20. ug/kg				0.00045 ug/l				22.77 ug/kg		69.33 ug/kg	
SVOC	62-75-9	N-Nitrosodimethylamine	60. ug/kg				0.0013 ug/l				0.00275 ug/kg		0.0321 ug/kg	
SVOC	924-16-3	N-Nitroso-di-n-butylamine	60. ug/kg				0.012 ug/l				772.04 ug/kg		267.07 ug/kg	
SVOC	621-64-7	N-Nitroso-di-n-propylamine	430. ug/kg				0.0096 ug/l				0.217 ug/kg		543.68 ug/kg	
SVOC	86-30-6	N-nitrosodiphenylamine	610,780. ug/kg				14. ug/l				155.24 ug/kg		545.14 ug/kg	
SVOC	59-89-2	N-Nitrosomorpholine									0.0037 ug/kg		70.57 ug/kg	
SVOC	10595-95-6	N-Nitroso-n-methylethylamine	140. ug/kg				0.0031 ug/l				0.00485 ug/kg		1.66 ug/kg	
SVOC	100-75-4	N-Nitrosopiperidine									0.0226 ug/kg		6.65 ug/kg	
SVOC	930-55-2	N-Nitrosopyrrolidine	1,430. ug/kg				0.032 ug/l				0.00091 ug/kg		12.56 ug/kg	
SVOC	126-68-1	o,o,o-triethylphosphorothioate									188.94 ug/kg		817.57 ug/kg	
SVOC	95-53-4	o-Toluidine	12,470. ug/kg				0.199 ug/kg				0.199 ug/kg		2,970. ug/kg	
SVOC	60-11-7	p-Dimethylaminoazobenzene									317.99 ug/kg		39.76 ug/kg	
SVOC	608-93-5	Pentachlorobenzene	855,090. ug/kg		690. ug/kg		29. ug/l				1,260. ug/kg		496.95 ug/kg	
SVOC	82-68-8	Pentachloronitrobenzene	11,510. ug/kg				0.26 ug/l				18,200. ug/kg		7,090. ug/kg	
SVOC	87-86-5	Pentachlorophenol	14,540. ug/kg		690. ug/kg		0.56 ug/l				30,100. ug/kg		119.27 ug/kg	
SVOC	62-44-2	Phenacetin									2.25 ug/kg		11,700. ug/kg	
SVOC	85-01-8	Phenanthrene			850. ug/kg						41.9 ug/kg		45,700. ug/kg	
SVOC	108-95-2	Phenol	100,000,000. ug/kg				22,000. ug/l				27.26 ug/kg		120,000. ug/kg	
SVOC	23950-58-5	Pronamide	80,165,080. ug/kg				2,700. ug/l				1.6 ug/kg		13.6 ug/kg	
SVOC	129-00-0	Pyrene	26,472,110. ug/kg		660. ug/kg		1,100. ug/l				53. ug/kg		78,500. ug/kg	
SVOC	110-86-1	Pyridine	1,068,870. ug/kg				37. ug/l				106.17 ug/kg		1,030. ug/kg	
SVOC	94-59-7	Safrole									164.86 ug/kg		403.98 ug/kg	
SVOC	3689-24-5	Tetraethyl dithiopyrophosphate	534,430. ug/kg				18. ug/l				559.98 ug/kg		596.34 ug/kg	
SVOC	297-97-2	Thionazine												
VOC	630-20-6	1,1,1,2-Tetrachloroethane	6,840. ug/kg				0.43 ug/l				10.89 ug/kg		225,000. ug/kg	
VOC	71-55-6	1,1,1-Trichloroethane	1,400,000. ug/kg		170. ug/kg		1,300. ug/l				246.85 ug/kg		29,800. ug/kg	
VOC	79-34-5	1,1,2,2-Tetrachloroethane	870. ug/kg		940. ug/kg		0.055 ug/l				29.08 ug/kg		127.22 ug/kg	
VOC	79-00-5	1,1,2-Trichloroethane	1,870. ug/kg				0.2 ug/l				673.51 ug/kg		28,600. ug/kg	
VOC	75-34-3	1,1-Dichloroethane	2,042,560. ug/kg				810. ug/l				0.575 ug/kg		20,100. ug/kg	
VOC	75-35-4	1,1-Dichloroethene	120. ug/kg				0.046 ug/l				23.27 ug/kg		8,280. ug/kg	
VOC	96-18-4	1,2,3-Trichloropropane	3,0754 ug/kg				31. ug/l				8.35 ug/kg		3,360. ug/kg	
VOC	96-12-8	1,2-Dibromo-3-chloropropane	2,140. ug/kg				0.048 ug/l				19.98 ug/kg		35.19 ug/kg	
VOC	106-93-4	1,2-Dibromoethane	30. ug/kg				0.00076 ug/l				12.37 ug/kg		1,230. ug/kg	
VOC	107-06-2	1,2-Dichloroethane	760. ug/kg				0.12 ug/l				54.18 ug/kg		21,200. ug/kg	
VOC	78-87-5	1,2-Dichloropropane	760. ug/kg				0.16 ug/l				351.61 ug/kg		32,700. ug/kg	
VOC	106-46-7	1,4-Dichlorobenzene	7,260. ug/kg		350. ug/kg		0.47 ug/l				1,450. ug/kg		545.59 ug/kg	
VOC	123-91-1	1,4-Dioxane	272,080. ug/kg				1. ug/l				0.00543 ug/kg		2,050. ug/kg	
VOC	78-93-3	2-Butanone	27,155,550. ug/kg				1,900. ug/l				136.96 ug/kg		89,600. ug/kg	
VOC	12-99-8	2-Chloro-1,3-butadiene												
VOC	591-78-6	2-Hexanone									1,010. ug/kg		12,600. ug/kg	
VOC	108-10-1	4-Methyl-2-pentanone	2,841,120. ug/kg				2,900. ug/l				544.37 ug/kg		443,000. ug/kg	
VOC	67-64-1	Acetone	6,051,720. ug/kg				610. ug/l							
VOC	75-05-8	Acetonitrile	1,348,590. ug/kg				220. ug/l							

TABLE 5-1
PROJECT STANDARDS
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

CAS Analyte Group	CAS Analyte Number	CAS Analyte Name	EPA Region 5 Industrial PRG Concentration (Soil)	PRG Unit	EPA Ecotox Thresholds Concentration (Sediment)	Ecotox Unit	EPA Region 5 DQL Concentration (Water)	DQL Unit	Average Background Inorganics	Bkg Unit	EPA Region 5 Ecological DQL Concentration (Sediment)	Eco DQL Unit	EPA Region 5 Ecological DQL Concentration (Soil)	Eco DQL Unit
VOC	107-02-8	Acrolein	340. ug/kg				730. ug/l							
VOC	107-13-1	Acrylonitrile	490. ug/kg				3.7 ug/l							
VOC	107-18-6	Allyl Chloride	5,344,340. ug/kg				1,800. ug/l							
VOC	71-43-2	Benzene	1,360. ug/kg				0.39 ug/l							
VOC	75-27-4	Bromodichloromethane	2,300. ug/kg				0.18 ug/l				141.57 ug/kg		254.62 ug/kg	
VOC	75-25-2	Bromoform	378,870. ug/kg				8.5 ug/l				1.13 ug/kg		539.78 ug/kg	
VOC	74-83-9	Bromomethane	13,080. ug/kg				8.7 ug/l				996.27 ug/kg		15,900. ug/kg	
VOC	75-15-0	Carbon Disulfide	1,202,350. ug/kg				21. ug/l				0.148 ug/kg		235.16 ug/kg	
VOC	56-23-5	Carbon tetrachloride	520. ug/kg				0.17 ug/l				133.97 ug/kg		94.12 ug/kg	
VOC	108-90-7	Chlorobenzene	183,370. ug/kg		820. ug/kg		39. ug/l				35.73 ug/kg		2,980. ug/kg	
VOC	75-00-3	Chloroethane	1,600,000. ug/kg				710. ug/l				61.94 ug/kg		13,100. ug/kg	
VOC	67-66-3	Chloroform	520. ug/kg				0.16 ug/l				58,600. ug/kg			
VOC	74-87-3	Chloromethane	2,650. ug/kg				1.5 ug/l				27. ug/kg		1,190. ug/kg	
VOC	10061-01-5	cis-1,3-Dichloropropene	550. ug/kg				0.081 ug/l				0.0785 ug/kg		10,400. ug/kg	
VOC	124-48-1	Dibromochloromethane	35,630. ug/kg				1. ug/l				2.96 ug/kg		397.86 ug/kg	
VOC	74-95-3	Dibromomethane	10,688,680. ug/kg				370. ug/l				267.61 ug/kg		2,050. ug/kg	
VOC	75-71-8	Dichlorodifluoromethane	308,080. ug/kg				390. ug/l				0.0859 ug/kg		65,000. ug/kg	
VOC	97-63-2	Ethyl methacrylate	140,000. ug/kg				550. ug/l				1.33 ug/kg		39,500. ug/kg	
VOC	100-41-4	Ethylbenzene	230,000. ug/kg		3,600. ug/kg		1,300. ug/l				0.602 ug/kg		30,000. ug/kg	
VOC	78-83-1	Isobutyl Alcohol	40,000,000. ug/kg				11,000. ug/l				0.1 ug/kg		5,160. ug/kg	
VOC	126-98-7	Methacrylonitrile	8,430. ug/kg				1. ug/l				3,350. ug/kg		20,800. ug/kg	
VOC	74-88-4	Methyl Iodide									0.0297 ug/kg		57.05 ug/kg	
VOC	80-62-6	Methyl Methacrylate	7,255,740. ug/kg				2,900. ug/l				0.305 ug/kg		1,230. ug/kg	
VOC	75-09-2	Methylene chloride	20,030. ug/kg				4.3 ug/l				167.56 ug/kg		984,000. ug/kg	
VOC	76-01-7	Pentachloroethane									1,260. ug/kg		4,050. ug/kg	
VOC	107-12-0	Propionitrile									689.18 ug/kg		10,700. ug/kg	
VOC	100-42-5	Styrene	1,700,000. ug/kg				1,600. ug/l				114.66 ug/kg		49.83 ug/kg	
VOC	127-18-4	Tetrachloroethene	16,170. ug/kg		530. ug/kg		1.1 ug/l				444.96 ug/kg		4,690. ug/kg	
VOC	108-88-3	Toluene	520,000. ug/kg		670. ug/kg		720. ug/l				195.83 ug/kg		9,920. ug/kg	
VOC	156-60-5	trans-1,2-Dichloroethene	213,130. ug/kg				120. ug/l				52,500. ug/kg		5,450. ug/kg	
VOC	10061-02-6	trans-1,3-Dichloropropene	550. ug/kg				0.081 ug/l				208.94 ug/kg		783.73 ug/kg	
VOC	110-57-6	trans-1,4-Dichloro-2-butene					0.0012 ug/l				2.96 ug/kg		397.86 ug/kg	
VOC	79-01-6	Trichloroethene	6,050. ug/kg		1,600. ug/kg		1.6 ug/l				1.82 ug/kg			
VOC	75-69-4	Trichlorofluoromethane	1,276,310. ug/kg				1,300. ug/l				179.56 ug/kg		12,400. ug/kg	
VOC	108-05-4	Vinyl Acetate	1,396,510. ug/kg				37,000. ug/l				3.07 ug/kg		16,400. ug/kg	
VOC	75-01-4	Vinyl chloride	50. ug/kg				0.02 ug/l				12.95 ug/kg		12,700. ug/kg	
VOC	1330-20-7	Xylene (total)	320,000. ug/kg				1,400. ug/l				2. ug/kg		646.14 ug/kg	
WET	1689-84-5	Chloride	21,377.35 mg/kg								1,880. ug/kg		10,000. ug/kg	
WET	PS	Percent Solids												
WET	18496-25-8	Sulfide											0.00358 mg/kg	
WET	57-12-5	Total Cyanide	21,380.3 mg/kg				6.2 ug/l				0.0001 mg/kg		1.33 mg/kg	

Notes:

Blanks indicate no standard available

PRG = Preliminary Remedial Goals

DQL = Data Quality Levels

TABLE 5-2
BACKGROUND METALS DATA
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI

Field Sample Identification	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead Result
BGS:SL:BG01-01		8.3	93.8	1.	1.	27.6	9.3	18.6	29.1
BGS:SL:BG01-02		27.5	108.	1.	1.6	25.5	9.3	38.1	13.9
BGS:SL:BG03-01		9.7	171.	1.3	1.1	35.4	13.8	33.2	15.7
BGS:SL:BG03-01-FD		7.8	98.4	1.1	1.	30.5	8.7	24.4	12.
BGS:SL:BG03-02		9.3	104.	0.9	1.1	25.9	12.4	28.1	12.2
BGS:SL:BG05-01	0.52	8.2	140.	1.4	0.88	37.1	12.	24.8	16.8
BGS:SL:BG05-02	0.71	6.	90.9	0.88	0.76	25.5	6.9	24.4	10.5
BGS:SL:BG06-01	0.48	6.6	89.1	0.89	0.6	31.	7.5	20.3	11.3
BGS:SL:BG06-02	0.86	9.	70.3	0.79	0.85	23.8	10.	24.4	10.6
BGS:SL:BG07-01		6.9	75.8	0.8	0.57	23.9	6.8	14.3	11.9
BGS:SL:BG07-02	0.76	7.8	92.2	0.91	0.84	25.5	15.7	26.5	11.5
Low	0.48	6.	70.3	0.79	0.57	23.8	6.8	14.3	10.5
High	0.86	27.5	171.	1.4	1.6	37.1	15.7	38.1	29.1
Average	0.67	9.74	103.05	1.	0.94	28.34	10.22	25.19	14.14
Median	0.71	8.2	93.8	0.91	0.88	25.9	9.3	24.4	12.

Field Sample Identification	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Tin mg/kg	Vanadium mg/kg	Zinc mg/kg
BGS:SL:BG01-01	0.03	22.5				1.6	43.6	94.3
BGS:SL:BG01-02	0.04	33.8		0.29		1.	49.	87.5
BGS:SL:BG03-01	0.02	41.2		0.17		1.	51.	84.
BGS:SL:BG03-01-FD		31.2				1.2	42.4	72.6
BGS:SL:BG03-02	0.04	33.3	0.84			1.1	38.8	70.8
BGS:SL:BG05-01	0.05	34.4	1.3		1.2	1.8	50.6	117.
BGS:SL:BG05-02		25.5		0.16		1.2	37.4	64.8
BGS:SL:BG06-01	0.03	23.1	0.95			1.	42.6	69.2
BGS:SL:BG06-02		29.7				1.1	35.6	66.
BGS:SL:BG07-01	0.03	18.3	0.81				37.2	56.2
BGS:SL:BG07-02	0.02	32.1		0.18	1.	0.83	39.1	76.2
Low	0.02	18.3	0.81	0.16	1.	0.83	35.6	56.2
High	0.05	41.2	1.3	0.29	1.2	1.8	51.	117.
Average	0.032	29.55	0.97	0.2	1.1	1.18	42.48	78.05
Median	0.03	31.2	0.895	0.175	1.1	1.1	42.4	72.6

Notes:

- Blank indicates no detection

**TABLE 5-3
GEOTECHNICAL DATA RESULTS SUMMARY
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

SAMPLE NO	MOIST %	SAMPLE LOCATION	LIMITS		GRADATION					pH D4972	TOC D2974 %	pH NCRS 221	SMP Buffer pH	Exchangeable Cations Measured*					Cation Exchange Capacity
			LL %	PI %	GRAVEL %	SAND %	SILT %	CLAY %	USCS					K	Ca	Mg	Na	II meq	
S-01	28.69	S16:SL:SL01-GT	39	11	1.0	8.6	63.6	26.7	ML	7.93	9.11	8.4	> 7.00	11.8	430.9	44.6	40.8	0.00	27.3
S-02	21.25	S19:SL:GNF1-01-GT	43	22	2.5	5.3	56.8	35.4	CL	7.60	6.03	8.0	> 7.00	7.2	443.1	45.3	38.3	0.00	27.8
S-03	17.76	S29:SL:SF04-01-GT	32	14	7.5	15.5	47.0	30.1	CL	7.29	5.44	8.0	> 7.00	10.6	433.3	40.0	15.6	0.00	25.9
S-04	25.28	S09:SL:GNF2-01-GT	40	20	0.3	3.2	58.7	37.8	CL	6.91	5.22	7.5	> 7.00	14.1	226.5	41.0	35.7	0.00	16.7
S-05	23.52	S03:SL:SL02-GT	34	15	9.7	24.1	43.4	22.7	CL	7.44	5.77	7.8	> 7.00	11.3	399.0	33.3	4.8	0.00	23.2
S-06	26.85	S16:SL:GNC7-01-GT	28	9	0.0	1.7	72.0	26.4	CL	7.76	5.08	8.1	> 7.00	7.2	367.2	20.1	19.7	0.00	21.1
S-07	20.33	S27:SL:SF03-01-GT	35	15	0.8	8.0	56.9	34.3	CL	7.53	7.99	7.8	> 7.00	12.6	430.9	27.8	9.6	0.00	24.6
S-08	13.73	S51:SL:SF01-01-GT	38	18	8.2	15.7	43.0	33.1	CL	7.25	7.03	7.7	> 7.00	13.4	430.9	35.9	86.7	0.00	28.6
S-09	18.33	S42:SL:SL01-02-GT	35	16	7.8	16.7	50.6	25.0	CL	7.26	0.09	7.7	> 7.00	12.6	418.6	37.2	5.2	0.00	24.6
S-10	25.35	ACH:SL:SF03-01-GT	32	13	0.8	14.1	56.0	29.2	CL	7.15	7.17	7.7	> 7.00	13.6	415.0	25.0	4.5	0.00	23.4
S-11	21.91	S45:SL:SL01-GT	37	17	0.0	6.3	56.6	37.0	CL	6.98	7.47	7.5	> 7.00	16.8	410.1	34.8	9.6	0.00	24.3
S-12	18.07	ACF:SL:SF02-01-GT	39	17	0.9	6.1	56.4	36.6	CL	6.27	7.02	7.3	> 7.00	13.1	457.8	51.4	30.6	0.00	28.8
S-13	23.66	ACH:SL:SF02-01-GT	36	15	0.1	4.4	58.3	37.1	CL	7.38	7.14	7.7	> 7.00	13.1	434.5	31.8	9.0	0.00	25.1
S-14	27.55	S09:SL:GNF3-01-GT	45	23	0.0	4.2	60.7	35.2	CL	6.93	4.86	7.5	> 7.00	15.4	247.3	35.5	5.1	0.00	15.9
S-15	22.20	S43:SL:SL01-GT	40	17	03.4	19.8	44.4	32.4	CL	7.30	5.61	7.7	> 7.00	16.5	433.3	30.5	3.5	0.00	24.8
S-16	16.33	S03:SL:SL01-GT	38	18	0.2	8.7	53.5	37.7	CL	7.26	6.05	7.7	> 7.00	15.8	439.4	34.8	13	0.00	25.8
S-17	30.64	ACH:SL:SF03-01-GD	34	15	14.2	14.1	41.9	29.8	CL	8.04	8.61	7.9	> 7.00	10.9	417.4	29.3	4.5	0.00	23.8
S-18	23.30	ACA:SL:SF14-01-GT	38	19	0.5	9.3	55.1	35.1	CL	7.53	6.11	7.7	> 7.00	13.7	466.4	41.9	5.8	0.00	27.4
S-19	25.55	S01:SL:GNA6-01-GT	32	13	4.2	14.6	56.6	24.7	CL	7.38	4.30	7.8	> 7.00	10.7	408.8	40.7	6.3	0.00	24.4
S-20	20.69	S03:SL:SL02-GD	42	21	0.3	7.3	49.3	43.1	CL	6.99	5.23	8.0	> 7.00	9.9	443.1	40.9	30.6	0.00	27.1
S-21	24.33	S16:SL:SL02-GT	41	20	0.7	7.9	56.0	35.4	CL	7.01	7.83	7.4	> 7.00	14.8	445.6	52.2	16.5	0.00	27.7
S-22	17.96	S02:SL:SL01-GT	28	13	48.5	24.2	20.1	07.2	GC	7.20	6.79	7.5	> 7.00	18.6	357.4	19.9	4.6	0.00	20.2
S-23	20.19	S08:SL:SL01-GT	39	18	0.5	11.3	51.6	36.6	CL	7.78	8.27	7.7	> 7.00	12.0	429.6	44.9	15.6	0.00	26.2
S-24	19.31	S01:SL:SL01-GT	40	20	0.0	4.1	64.2	31.7	CL	7.74	7.26	7.5	> 7.00	14.1	406.4	60.5	71.4	0.00	28.8
S-25	21.49	S08:SL:SL02-GT	43	23	0.0	6.0	47.2	46.7	CL	7.46	6.26	7.0	> 7.00	18.3	395.4	52.9	17.0	0.00	25.4
S-26	21.81	S01:SL:SL02-GT	43	21	1.2	5.5	56.3	37.1	CL	6.16	8.14	7.2	> 7.00	13.6	423.5	55.3	63.8	0.00	28.9
S-27	18.69	S02:SL:SL02-GT	43	21	1.3	4.3	54.0	40.4	CL	6.04	7.50	7.0	> 7.00	11.3	413.7	64.5	125.0	0.00	31.8
S-28	23.75	S03:SL:GNB2-01-GT	36	16	0.4	6.8	48.5	44.3	CL	7.64	7.89	7.9	> 7.00	10.3	369.7	26.0	127.5	0.00	26.5
S-29	24.18	S15:SL:GNB1-01-GT	44	21	0.0	3.6	65.2	31.2	CL	6.78	4.71	7.6	> 7.00	13.7	368.4	45.6	18.4	0.00	23.4
S-30	25.52	S14:SL:GNB1-01-GT	40	19	0.2	7.1	60.0	32.7	CL	7.32	6.05	7.5	> 7.00	15.3	295.0	23.3	7.2	0.00	17.4
S-31	23.03	S12:SL:GNE2-01-GT	36	16	0.0	18.9	48.3	32.8	CL	7.15	7.37	7.5	> 7.00	12.7	345.2	47.0	8.5	0.00	21.9

**TABLE 5-3
GEOTECHNICAL DATA RESULTS SUMMARY
WASTE MANAGEMENT OF OHIO-VICKERY
PHASE I RFI**

SAMPLE NO	MOIST %	SAMPLE LOCATION	LIMITS		GRADATION					pH D4972	TOC D2974	pH NCRS 221	SMP Buffer pH	Exchangeable Cations Measured*					Cation Exchange Capacity
			LL %	PI %	GRAVEL %	SAND %	SILT %	CLAY %	USCS					K	Ca	Mg	Na	H	
														ppm in solution					meq
S-32	24.09	S15:SL:GNB4-01-GD	41	19	0.0	8.1	56.0	35.9	CL	6.97	5.64	6.9	> 7.00	11.8	213.0	42.3	10.7	0.00	14.9
S-33	26.83	ACC:SL:SF01-01-GT	45	23	5.0	11.5	48.6	34.9	CL	7.38	8.39	7.4	> 7.00	31.3	429.6	27.7	3.7	0.00	24.8
S-34	26.58	S12:SL:GNC2-01-GT	41	18	0.4	4.5	60.1	35.0	CL	6.99	7.02	7.5	> 7.00	15.7	408.8	35.4	7.9	0.00	24.1
S-35	20.15	S38:SL:SF01-01-GT	39	16	0.3	9.7	60.4	29.6	CL	7.31	6.03	7.5	> 7.00	14.7	440.7	41.5	11.6	0.00	26.4
S-36	15.66	S49:SL:SF01-01-GT	24	9	42.4	36.3	17.9	3.4	GC	7.13	5.14	7.5	> 7.00	8.6	378.2	20.8	15.2	0.00	21.5
S-37	22.82	S13:SL:GNB2-01-GD	37	17	0.1	16.9	52.4	30.6	CL	7.60	4.61	7.5	> 7.00	13.5	437.0	39.7	10.8	0.00	26.0
S-38	23.36	S13:SL:GNB2-01-GT	35	16	0.3	26.2	46.4	27.1	CL	7.38	10.18	7.6	> 7.00	12.6	445.6	34.5	9.6	0.00	25.9
S-39	25.40	S15:SL:GNB4-01-GT	37	18	0.0	7.8	59.4	32.8	CL	6.45	11.02	7.2	> 7.00	12.6	252.2	46.3	10.7	0.00	17.3
S-40	24.10	S41:SL:SF03-01-GT	32	13	4.0	36.0	39.4	20.6	CL	7.65	9.00	7.7	> 7.00	13.1	494.5	52.3	10.3	0.00	29.9
S-41	20.66	S32:SL:SF02-01-GT	46	23	0.1	5.4	58.3	36.2	CL	6.77	9.03	7.0	> 7.00	13.2	198.3	70.5	7.1	0.00	16.4
S-42	19.07	ACB:SL:SF02-01-GD	34	10	1.0	44.9	37.2	16.9	ML	7.21	10.98	7.7	> 7.00	11.7	417.4	49.2	10.2	0.00	25.7
S-43	19.74	ACB:SL:SF02-01-GT	37	16	0.3	12.4	63.2	24.1	CL	7.74	7.83	7.9	> 7.00	10.0	402.7	34.8	8.0	0.00	23.6
S-44	12.97	ACA:SL:SF09-01-GT	43	22	2.8	6.8	57.3	33.1	CL	7.31	17.40	7.5	> 7.00	13.1	406.4	62.6	8.6	0.00	26.2

Notes:

Atterberg Limits: LL = Liquid Limit

PI = Plasticity Index

USCS = Universal Soil Classification System

ML = Silt

CL = Lean clay, or lean clay with sand

GC = Clayey gravel with sand

TOC = Total Organic Carbon (Loss on Ignition Method)

K = Potassium

Ca = Calcium

Mg = Magnesium

Na = Sodium

H = Hydrogen

Cation Exchange Capacity measured in meq./100g

*Cation exchange capacity determined by summation according to American Society of Agronomy Monograph 9,

Part 2, Chapter 8 & 9. Method using 1N neutral ammonium acetate exchange solution. PH calibrated using North

Central Region Standard (NCRS) 221. Exchangeable hydrogen determined by the use of SMP buffer.

FIGURES

Figure 1-1
Site Location Plan
Waste Management of Ohio - Vickery

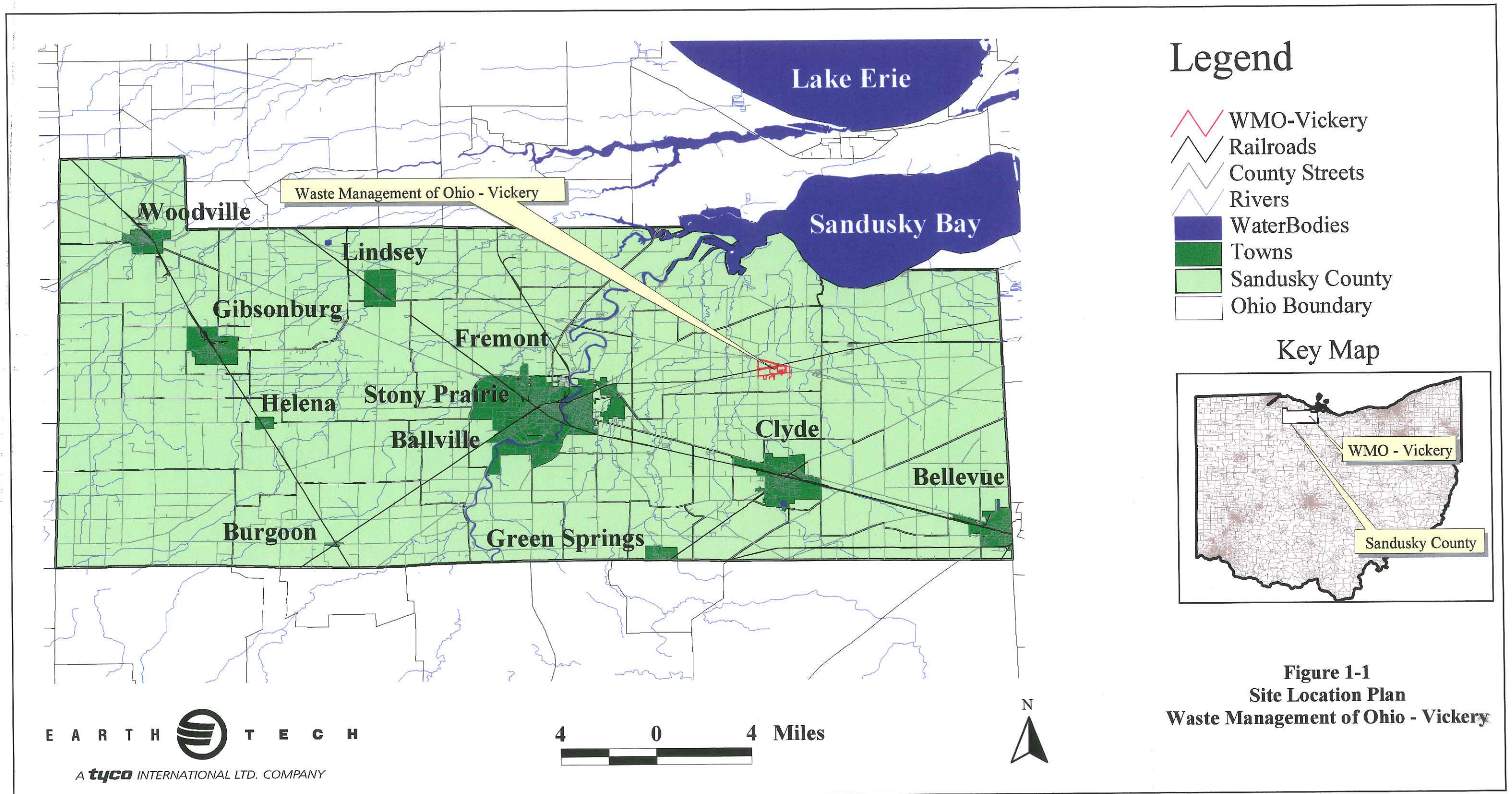
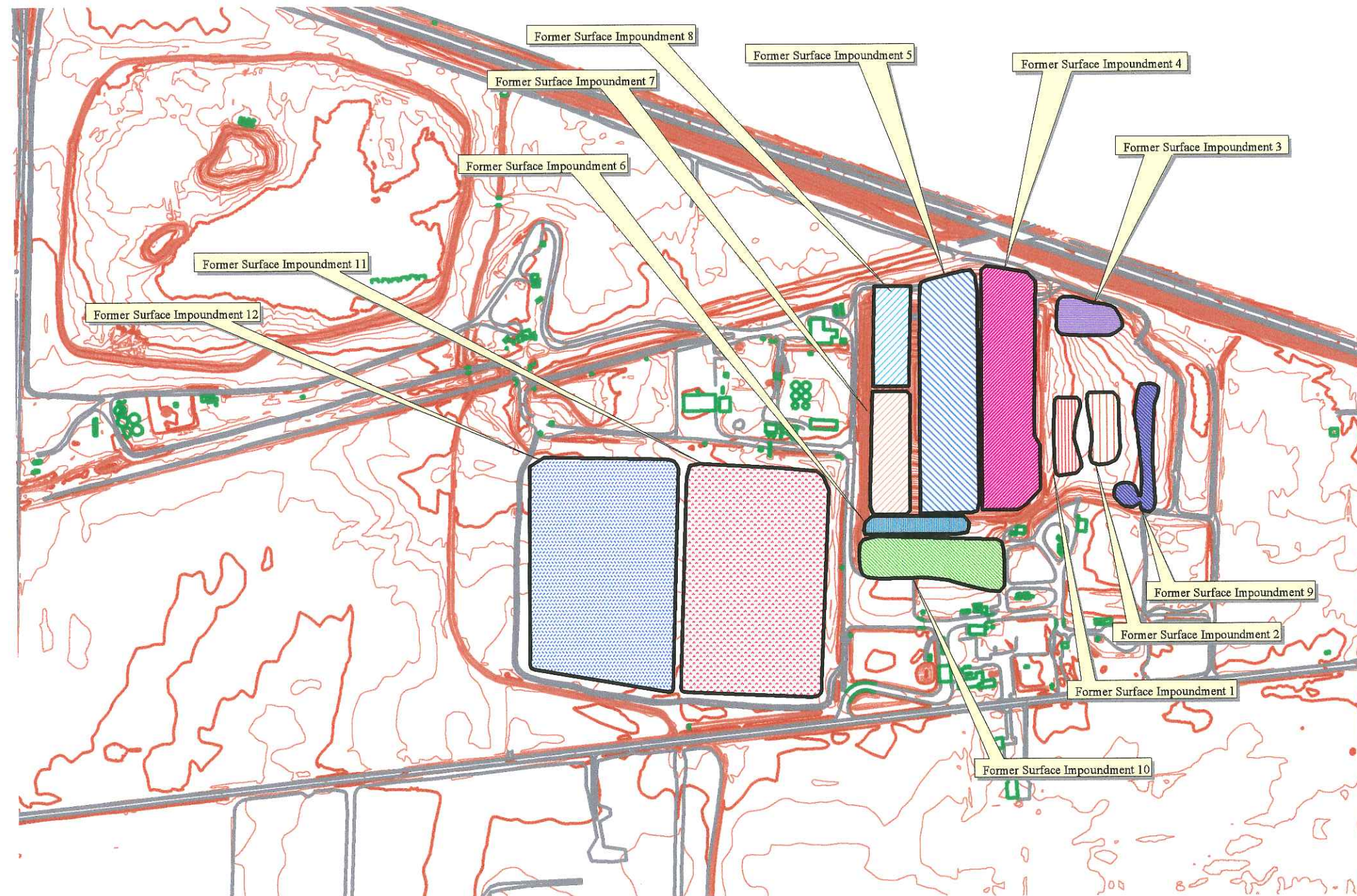


Figure 1-2
Former Surface Impoundment Locations
Waste Management of Ohio - Vickery



Legend

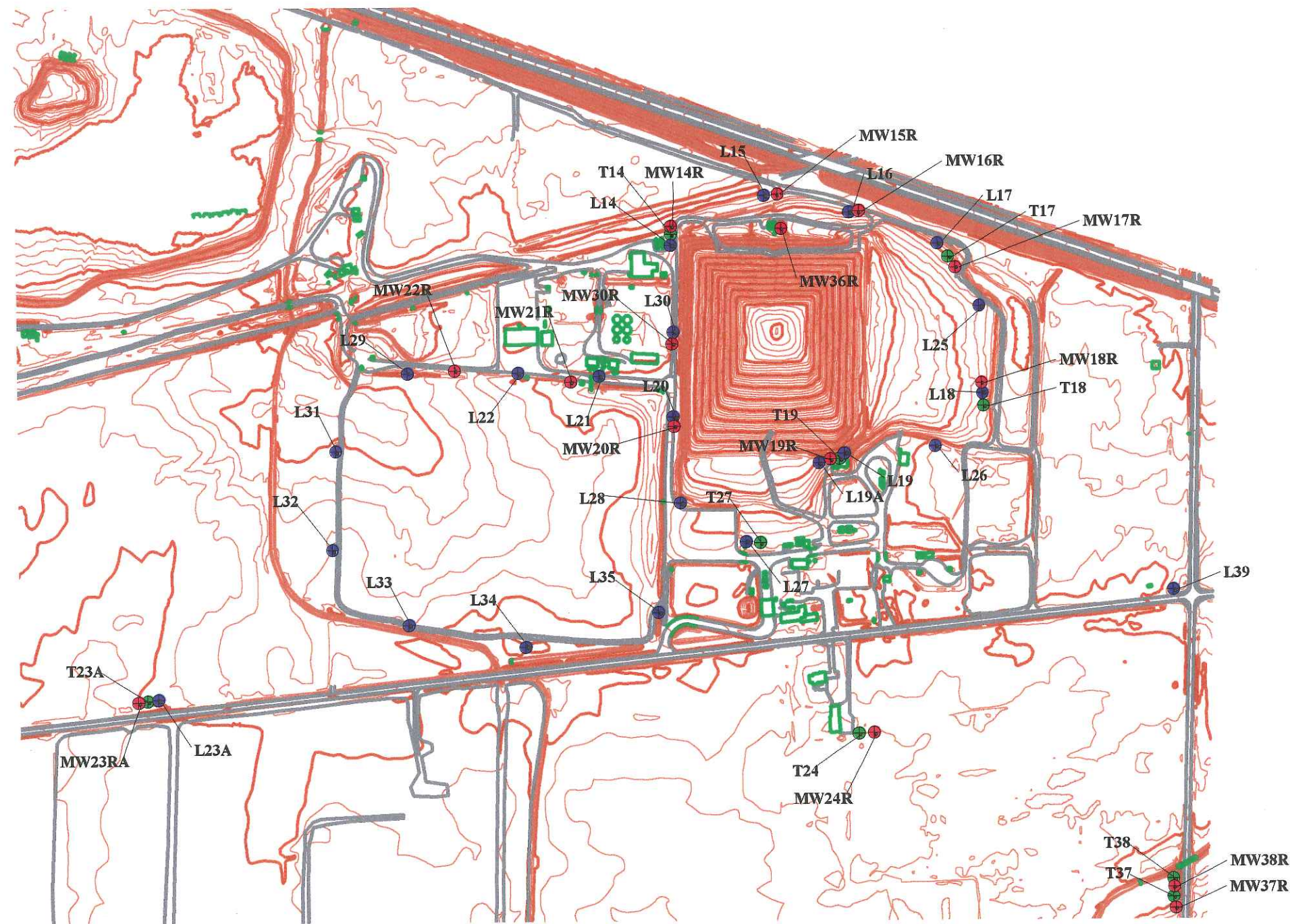
- Former Surface Impoundment 1 (SWMU 1)
- Former Surface Impoundment 2 (SWMU 2)
- Former Surface Impoundment 3 (SWMU 3)
- Former Surface Impoundment 4 (SWMU 4)
- Former Surface Impoundment 5 (SWMU 5)
- Former Surface Impoundment 6 (SWMU 6)
- Former Surface Impoundment 8 (See Note)
- Former Surface Impoundment 7 (SWMU 7)
- Former Surface Impoundment 9 (SWMU 8)
- Former Surface Impoundment 10 (SWMU 9)
- Former Surface Impoundment 11 (SWMU 10)
- Former Surface Impoundment 12 (SWMU 11)
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

Former Surface Impoundment 8 was combined with Former Surface Impoundment 7 sometime between 1979 and 1989.



Figure 3-1
Groundwater Monitoring System Well Locations
Waste Management of Ohio - Vickery



Legend

- Bedrock Wells
- Lacustrine Wells
- Till Wells
- ▬ Structures
- ▬ Pavement
- ▬ Minor Contours
- ▬ Major Contours

Figure 4-1
Solid Waste Management Unit Groups & Areas of Concern Locations
Waste Management of Ohio - Vickery

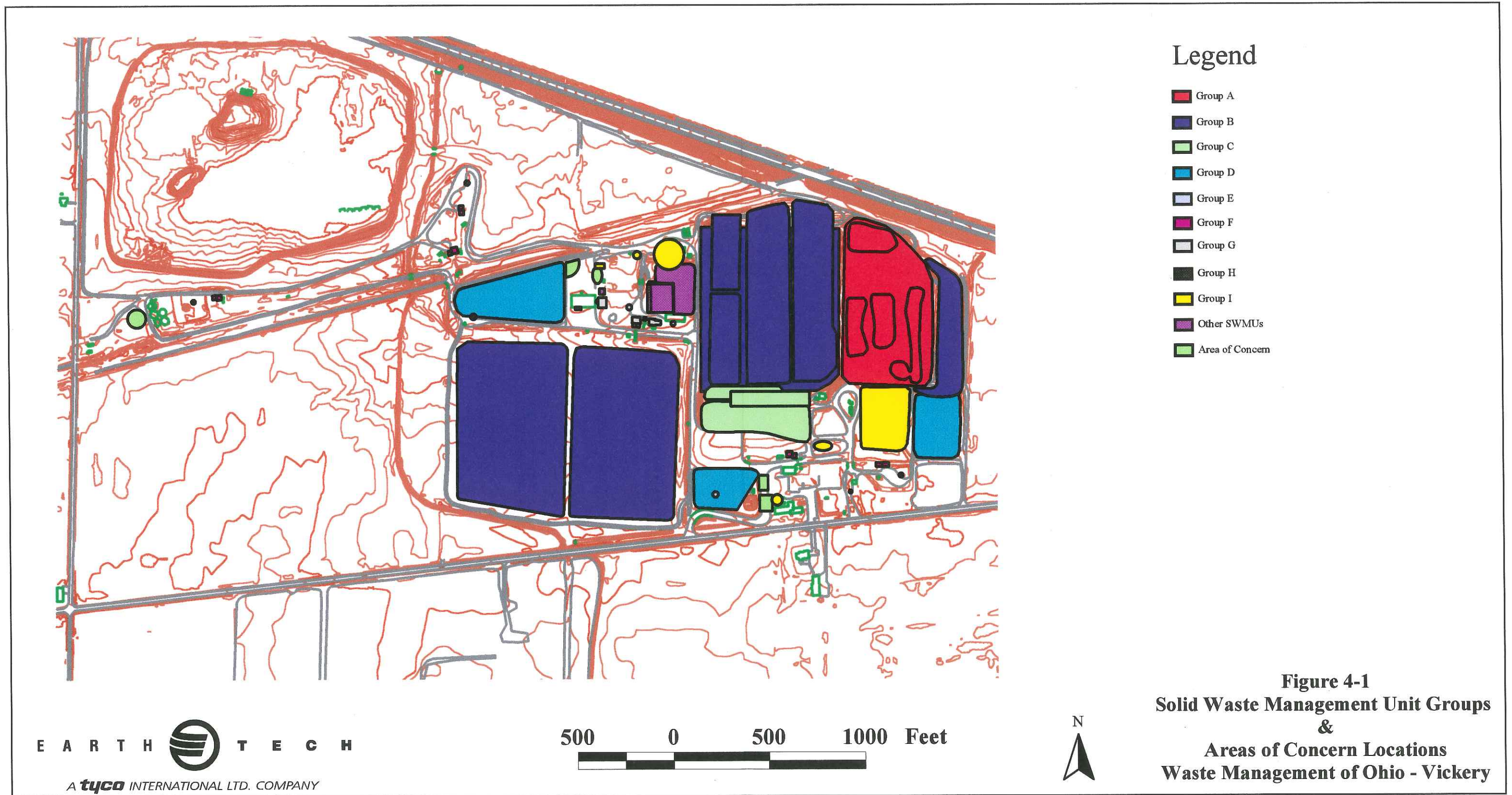


Figure 5-2.1a
Background Soil Sample Location Map
Waste Management of Ohio - Vickery

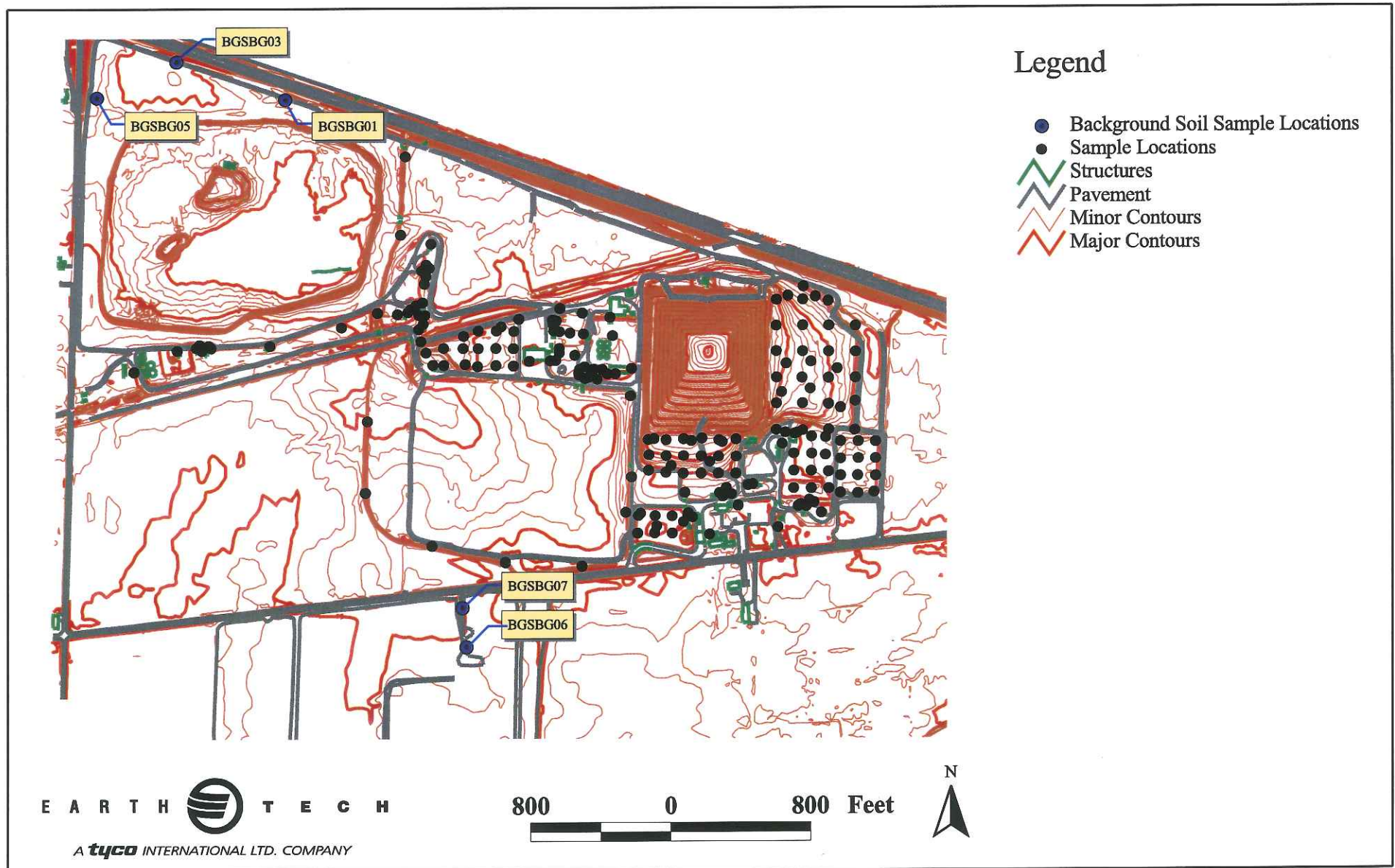


Figure 5-2.1b
Background Soil Sample Analytical Results Map
Waste Management of Ohio - Vickery

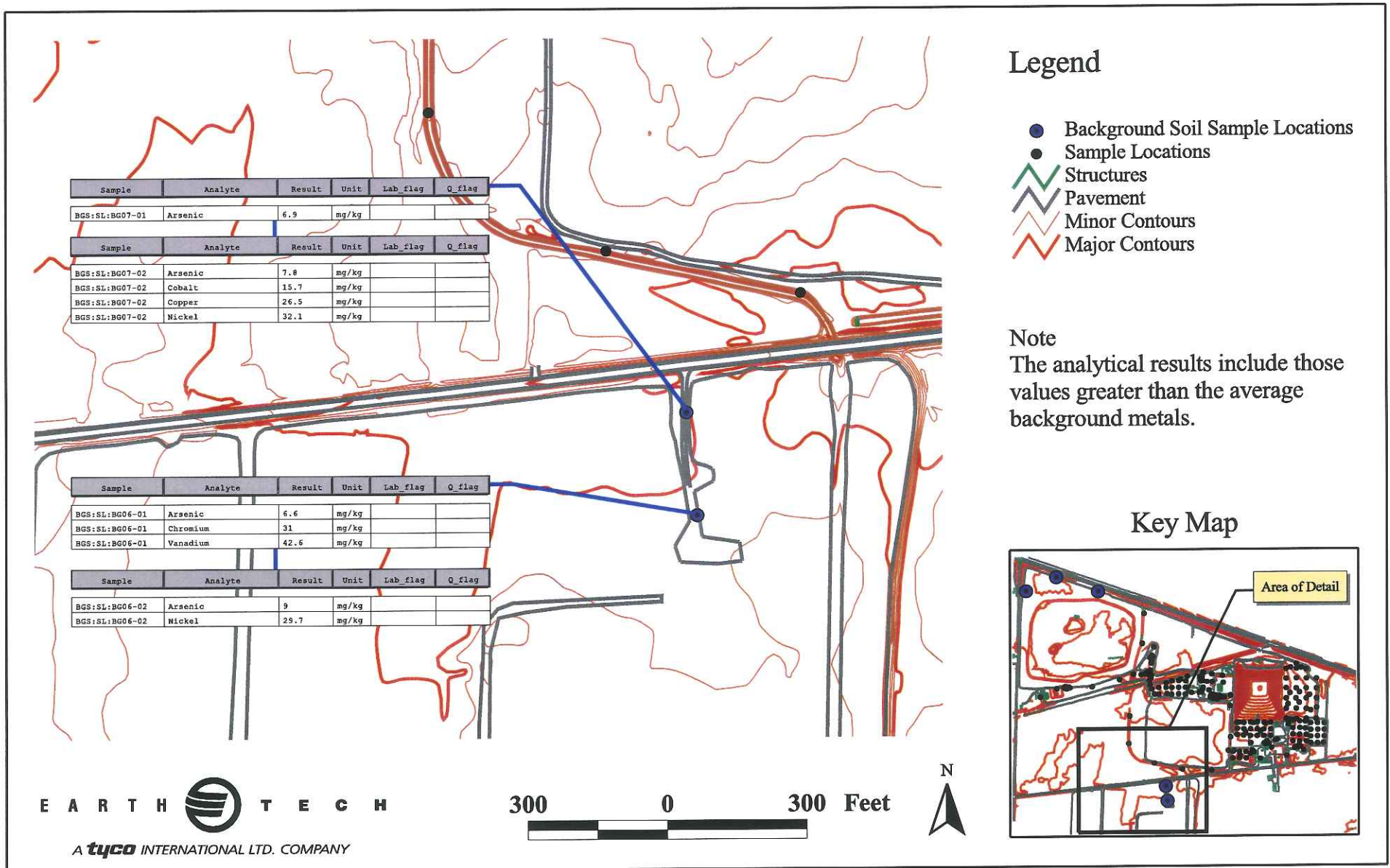
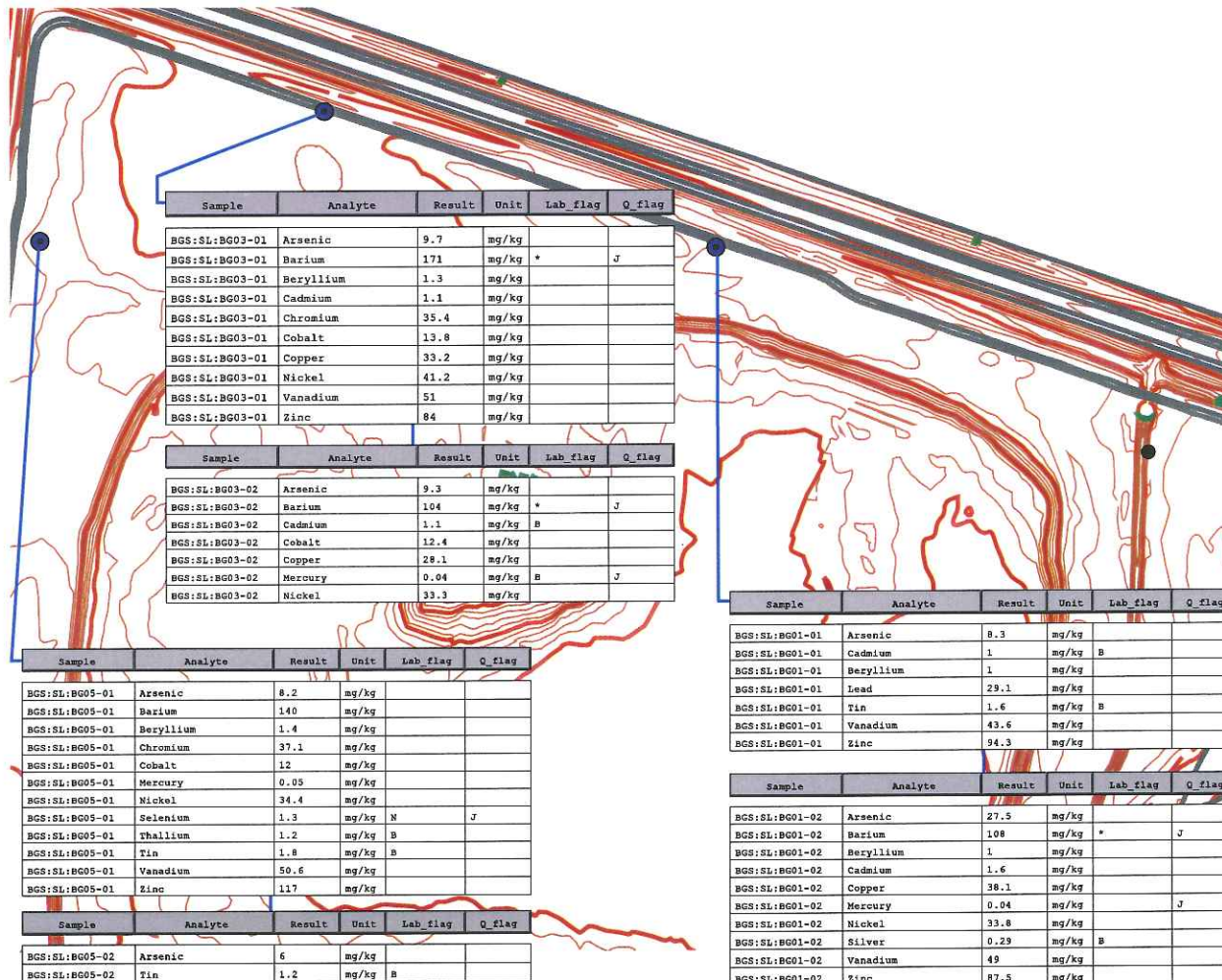


Figure 5-2.1c
Background Soil Sample Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- Background Soil Sample Locations
- Sample Locations
- ▲ Structures
- ▲ Pavement
- ▲ Minor Contours
- ▲ Major Contours

Note

The analytical results include those values greater than the average background metals.

Key Map

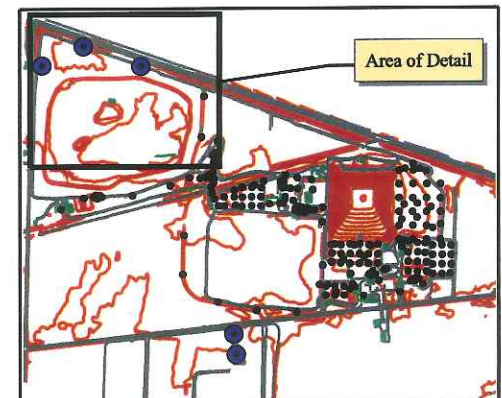
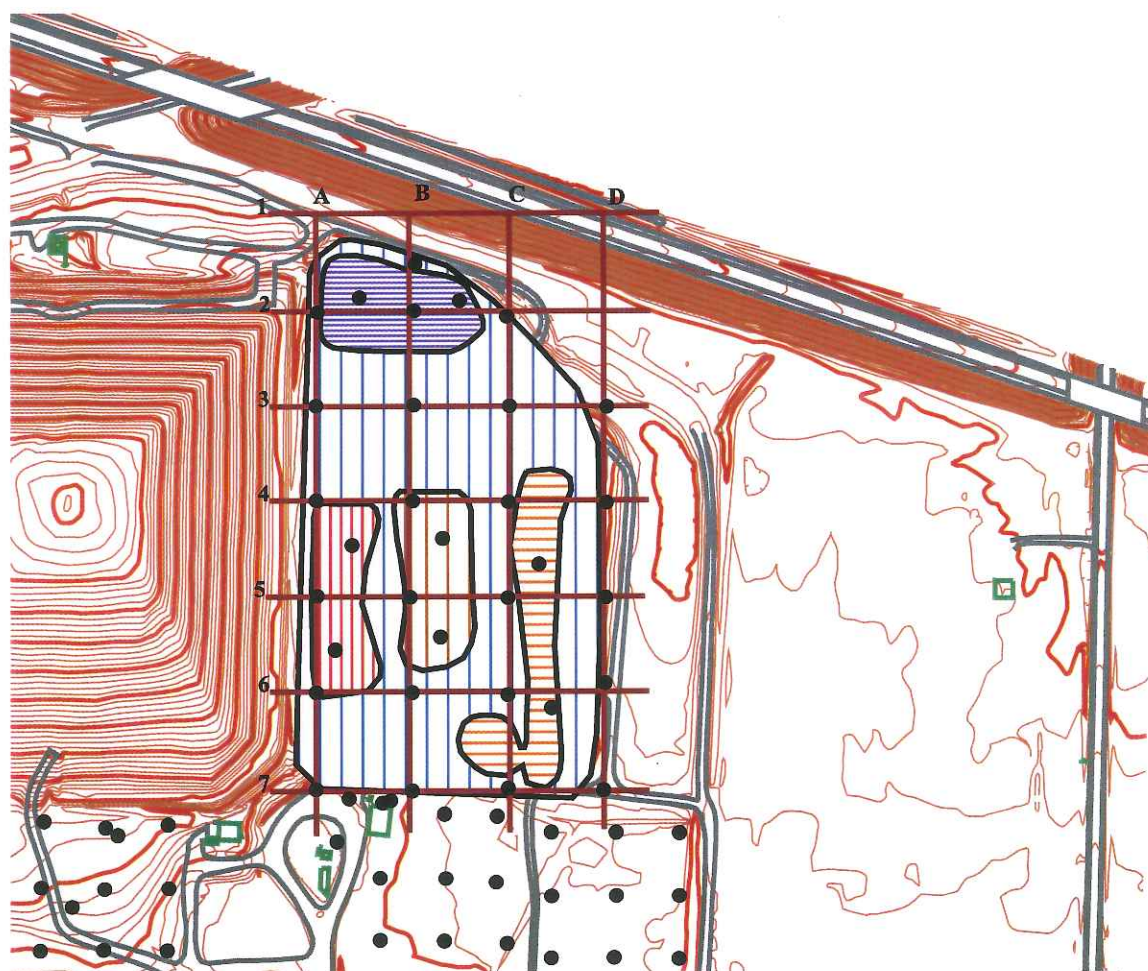


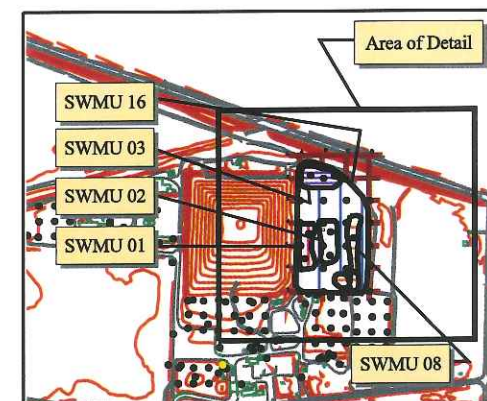
Figure 5-3.1a
Solid Waste Management Unit Group A (01, 02, 03, 08 & 16) Location Map
Waste Management of Ohio - Vickery



Legend

- Sample Locations
- SWMU 01, 02, 03, 08 & 16 Grid
- SWMU 08
- SWMU 03
- SWMU 02
- SWMU 01
- SWMU 16
- Structures
- Pavement
- Minor Contours
- Major Contours

Key Map



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300 0 300 Feet



Figure 5-3.1b
Solid Waste Management Unit 01 Analytical Results Map
Waste Management of Ohio - Vickery

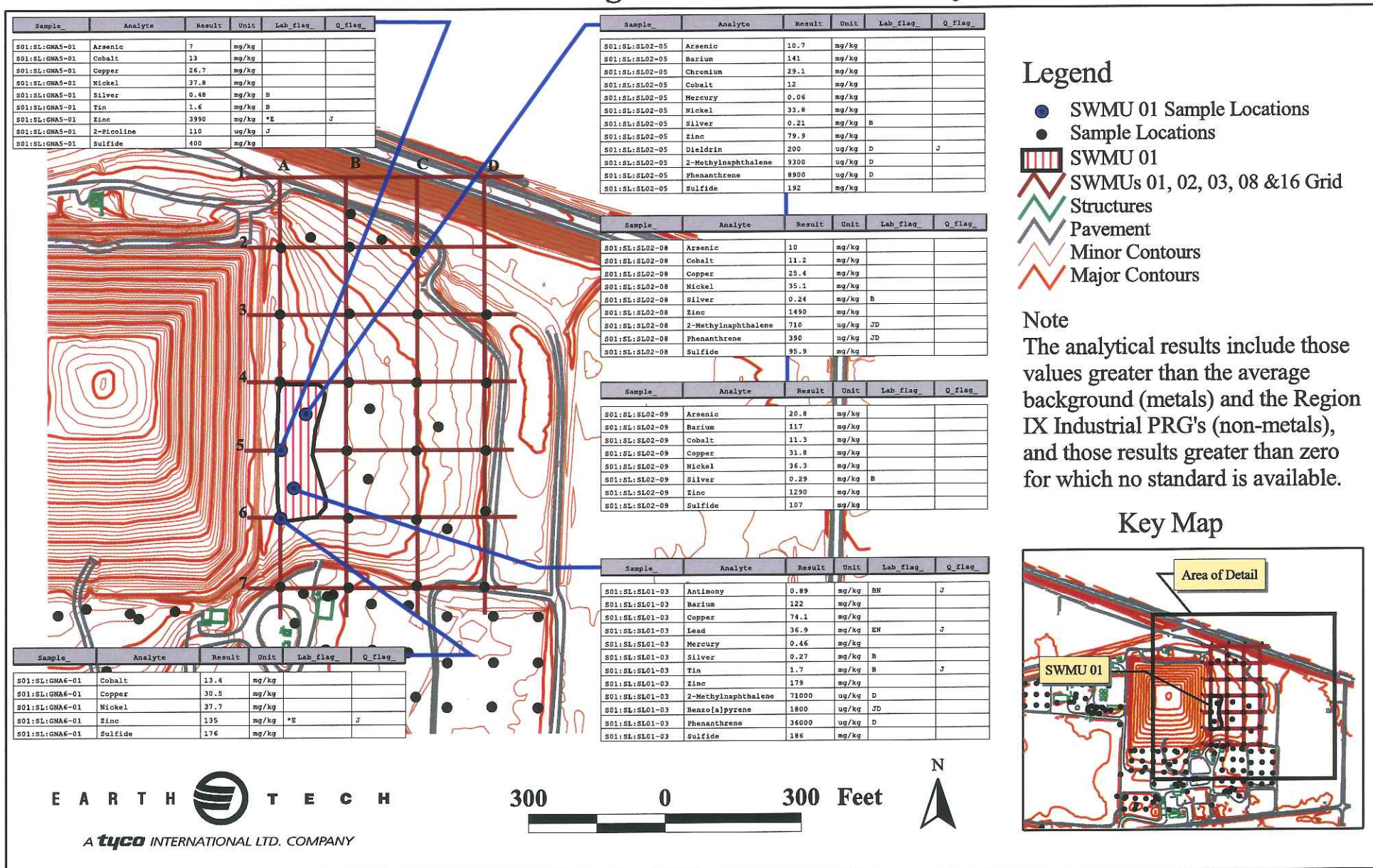


Figure 5-3.1c
Solid Waste Management Unit 02 Analytical Results Map
Waste Management of Ohio - Vickery

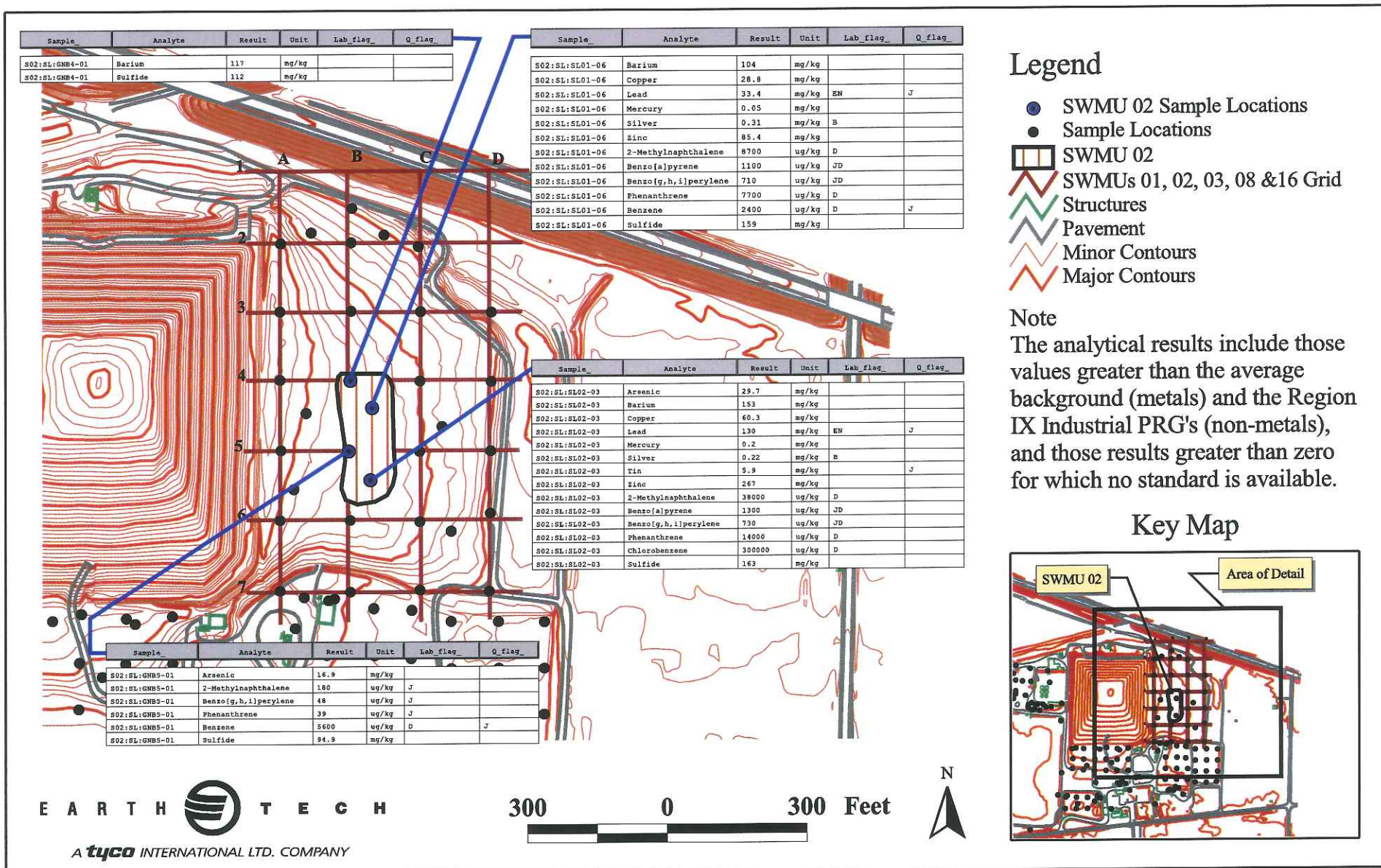


Figure 5-3.1d
Solid Waste Management Unit 03 Analytical Results Map
Waste Management of Ohio - Vickery

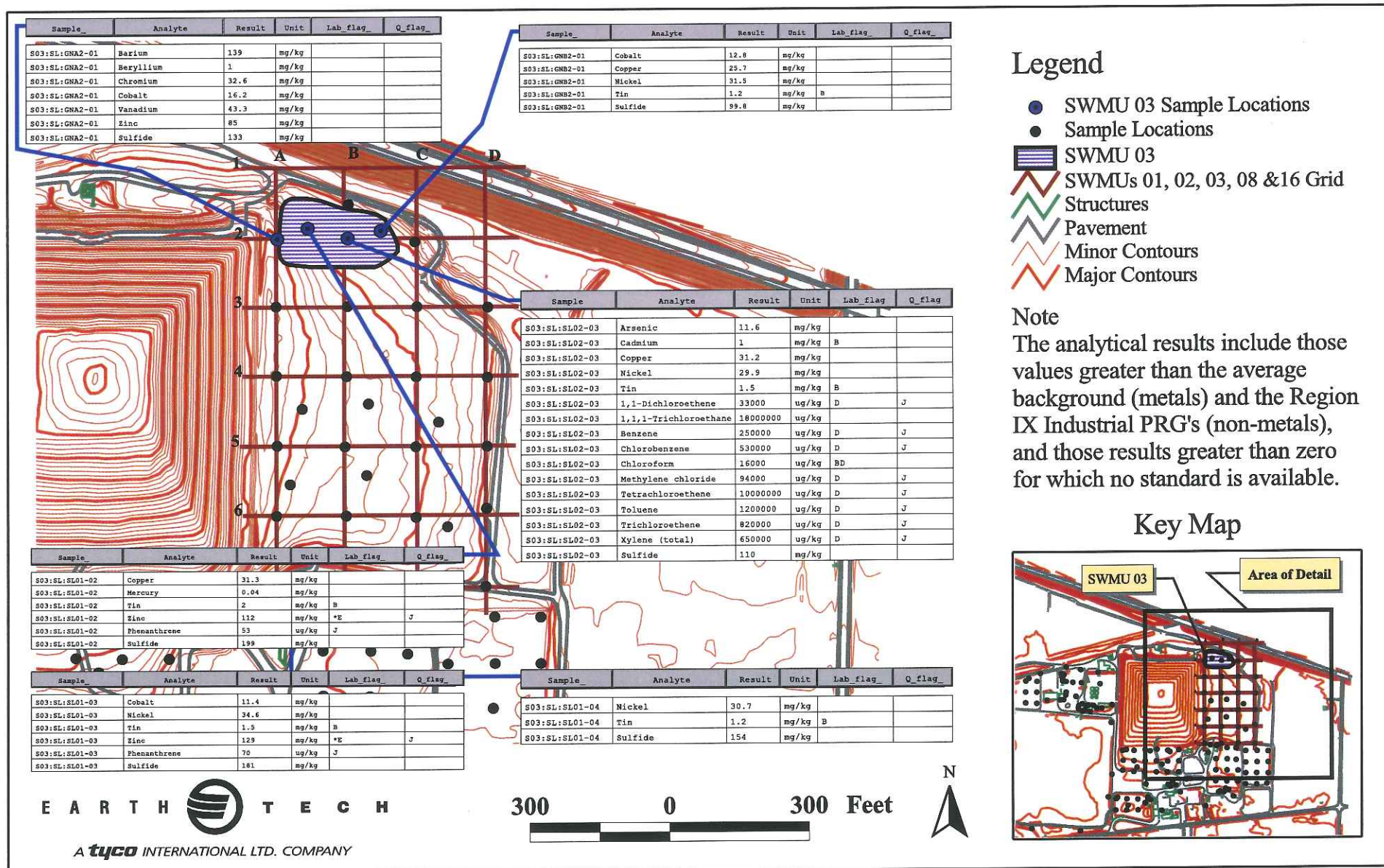
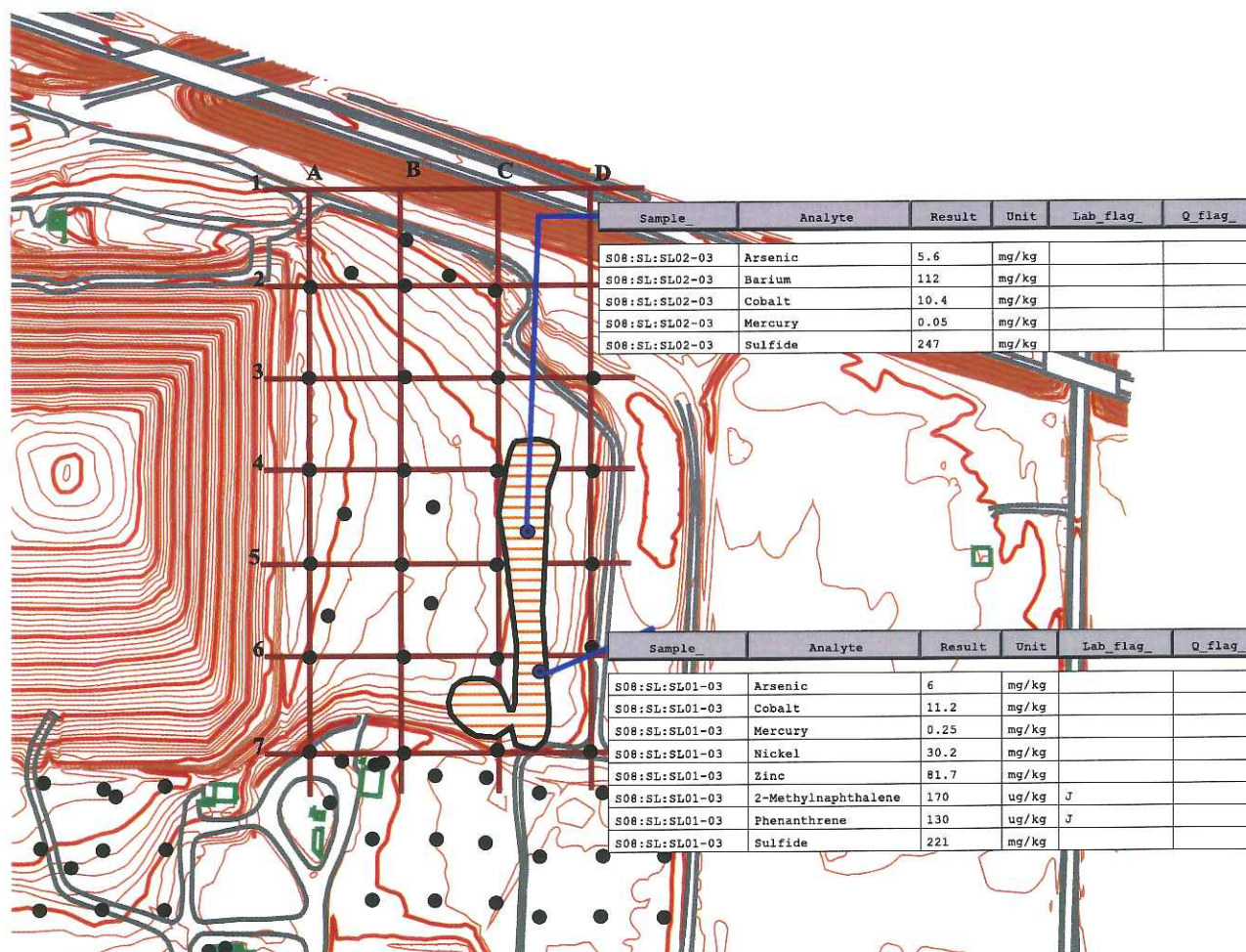


Figure 5-3.1e
Solid Waste Management Unit 08 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 08 Sample Locations
- Sample Locations
- SWMU 08
- SWMUs 01, 02, 03, 08 & 16 Grid
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

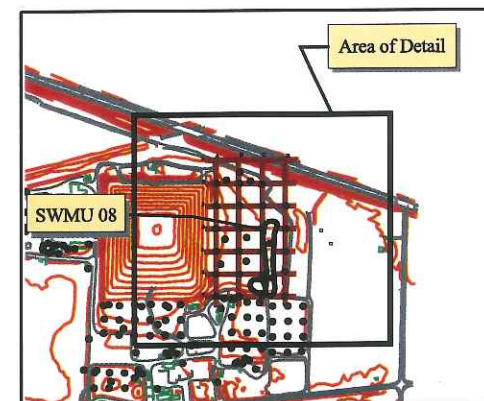


Figure 5-3.1f
Solid Waste Management Unit 16 Analytical Results Map
Waste Management of Ohio - Vickery

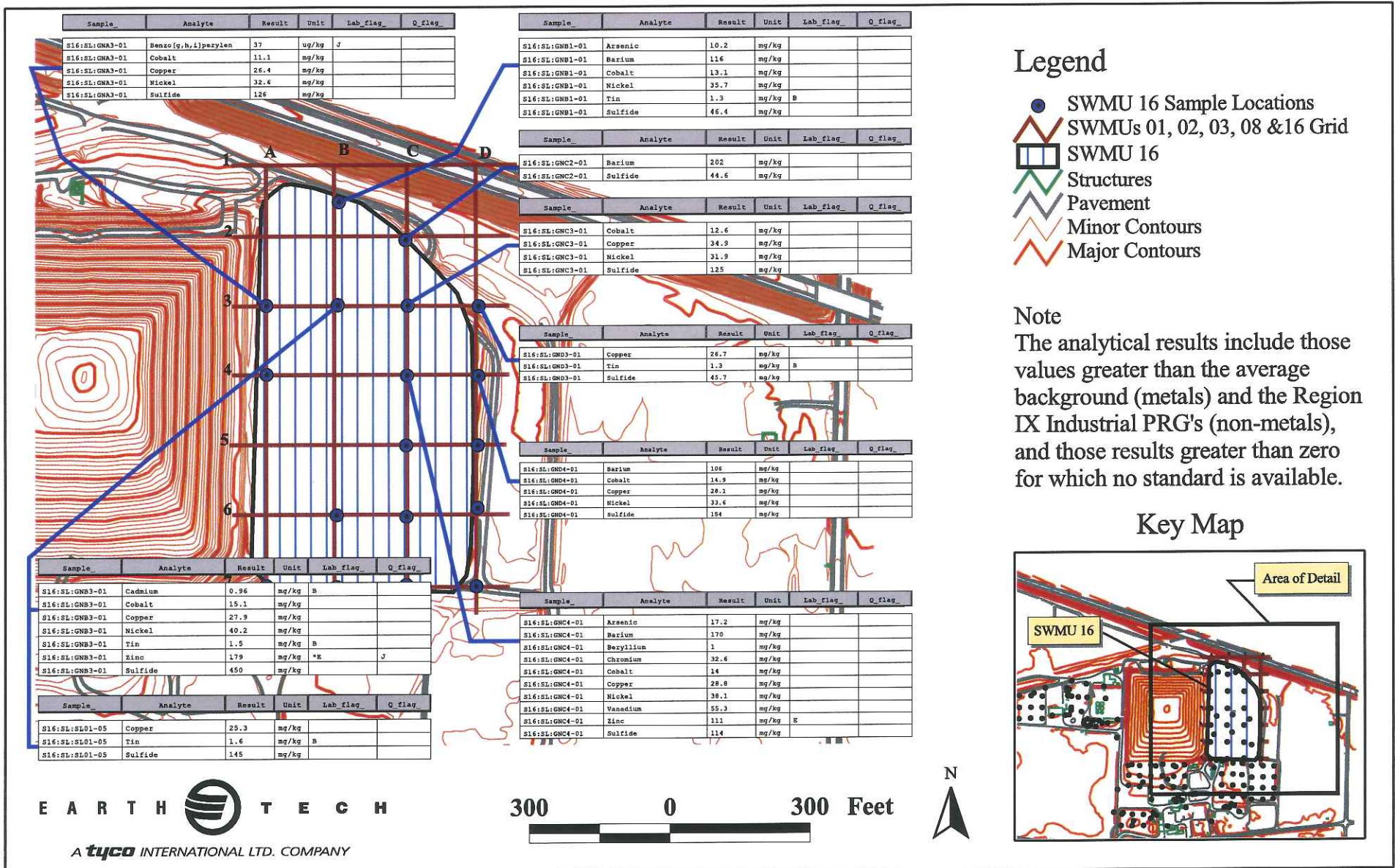
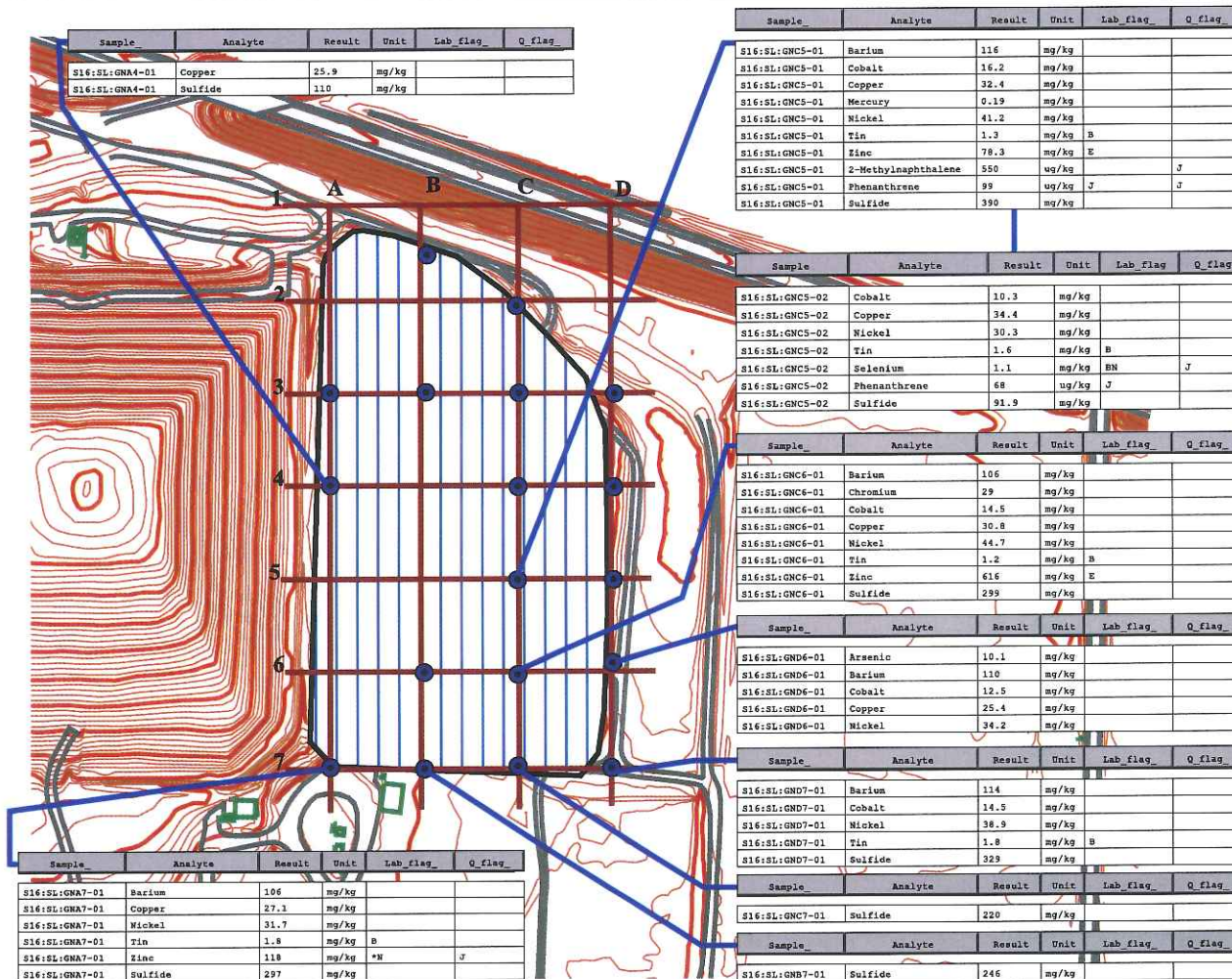


Figure 5-3.1g
Solid Waste Management Unit 16 Analytical Results Map
Waste Management of Ohio - Vickery



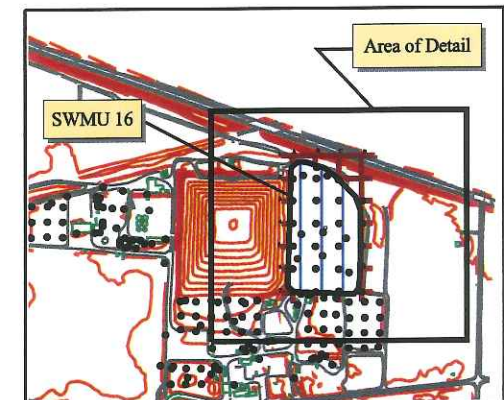
Legend

- SWMU 16 Sample Locations
- ▲ SWMUs 01, 02, 03, 08 & 16 Grid
- SWMU 16
- ▤ Structures
- ▤ Pavement
- ▤ Minor Contours
- ▤ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

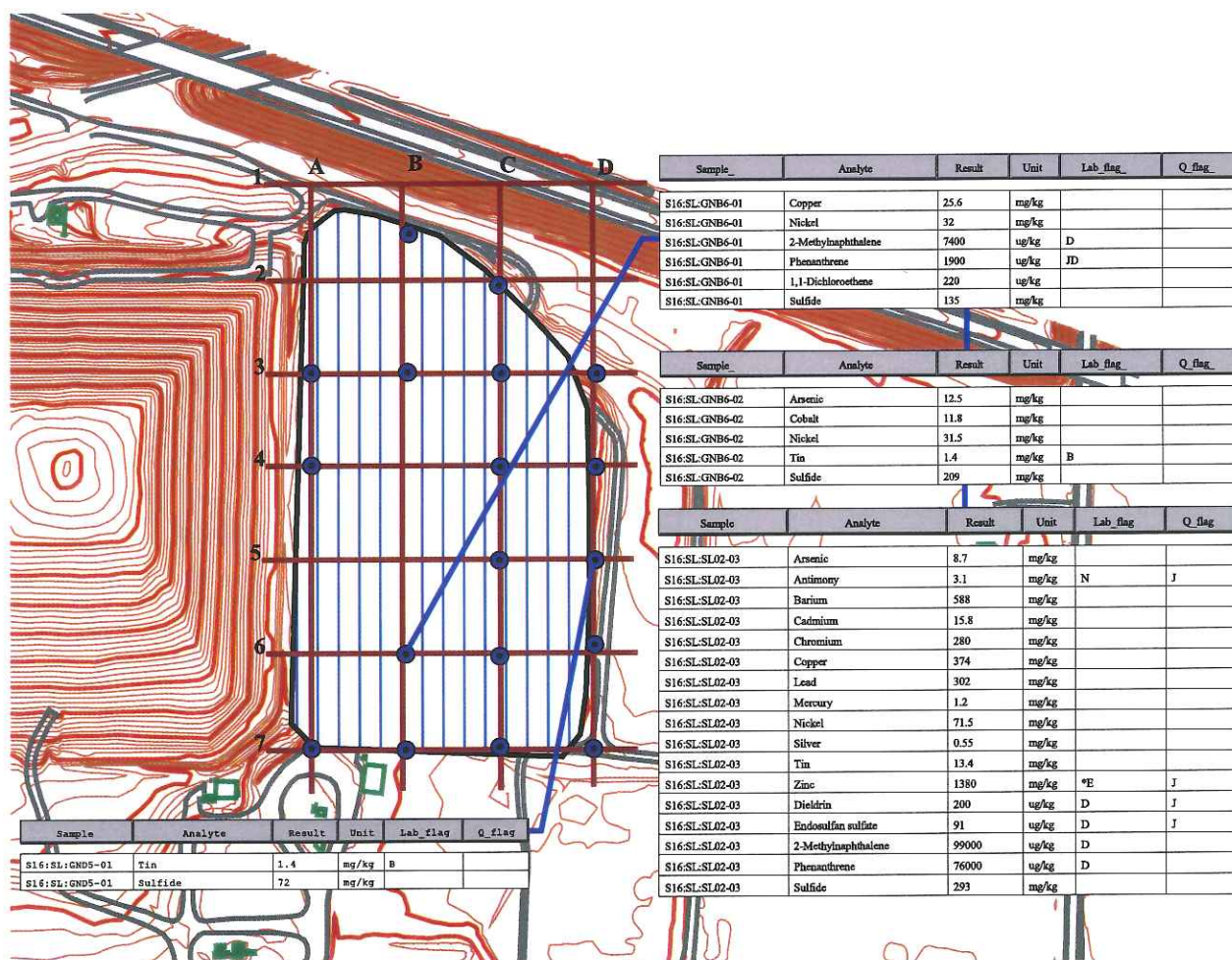


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300 0 300 Feet



Figure 5-3.1h
Solid Waste Management Unit 16 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 16 Sample Locations
- △ SWMUs 01, 02, 03, 08 & 16 Grid
- SWMU 16
- ▤ Structures
- ▤ Pavement
- ▤ Minor Contours
- ▤ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

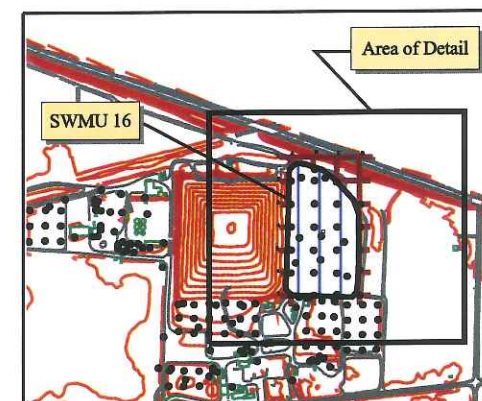
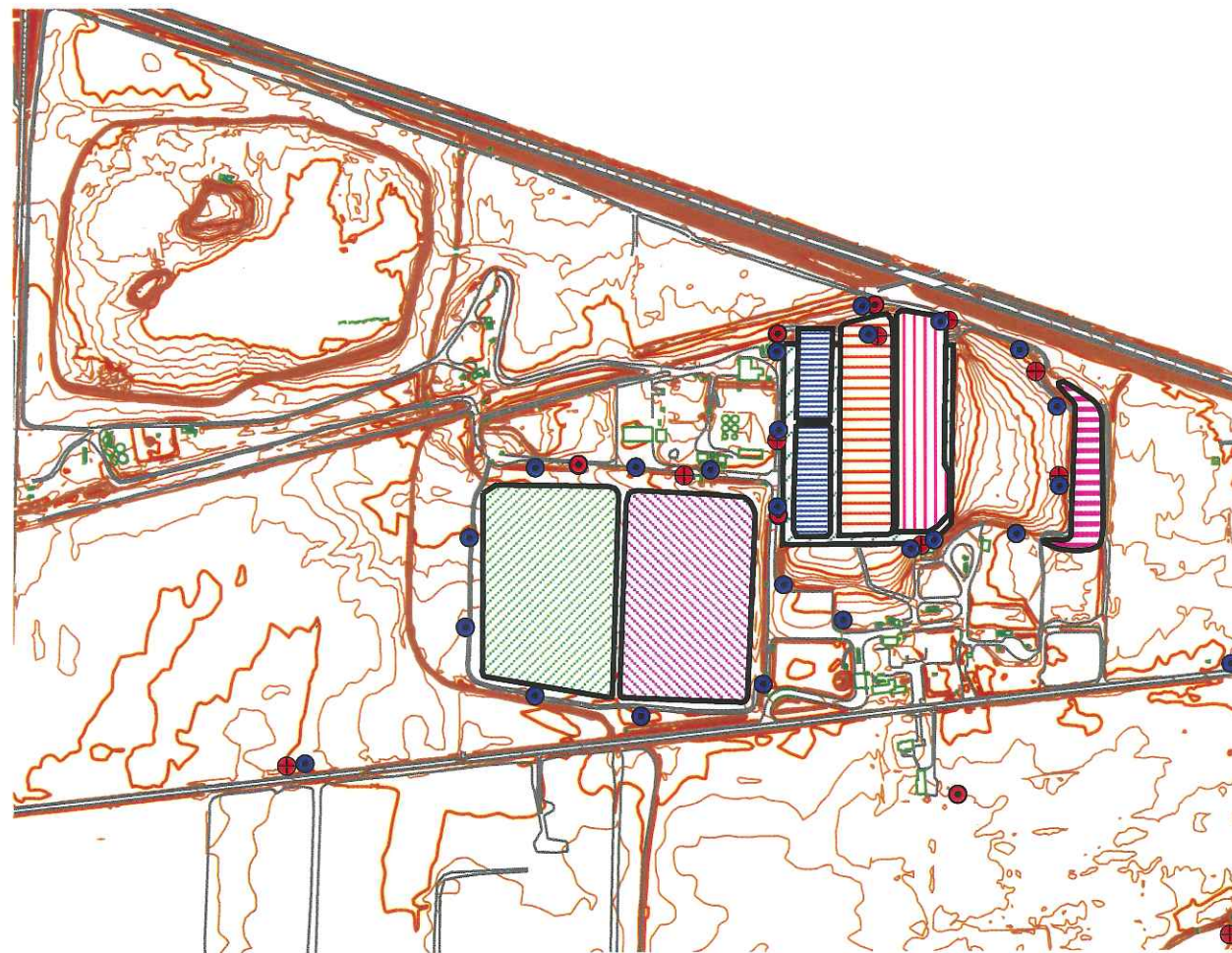


Figure 5-3.2a
Solid Waste Management Unit Group B (04, 05, 07, 10, 11, 17 & 53) Location Map
Waste Management of Ohio - Vickery



Legend

- Lacustrine Well Sampling Locations
- Lacustrine Welllls
- Bedrock Well Sampling Locations
- Bed rock Wells
- SWMU 4
- SWMU 5
- SWMU 7 & 8
- SWMU 10
- SWMU 11
- SWMU 17
- SWMU 53
- Structures
- Pavement
- Minor Contours
- Major Contours



Figure 5-3.2b
Solid Waste Management Unit Group B (Bedrock Wells) Analytical Results Map
Waste Management of Ohio - Vickery

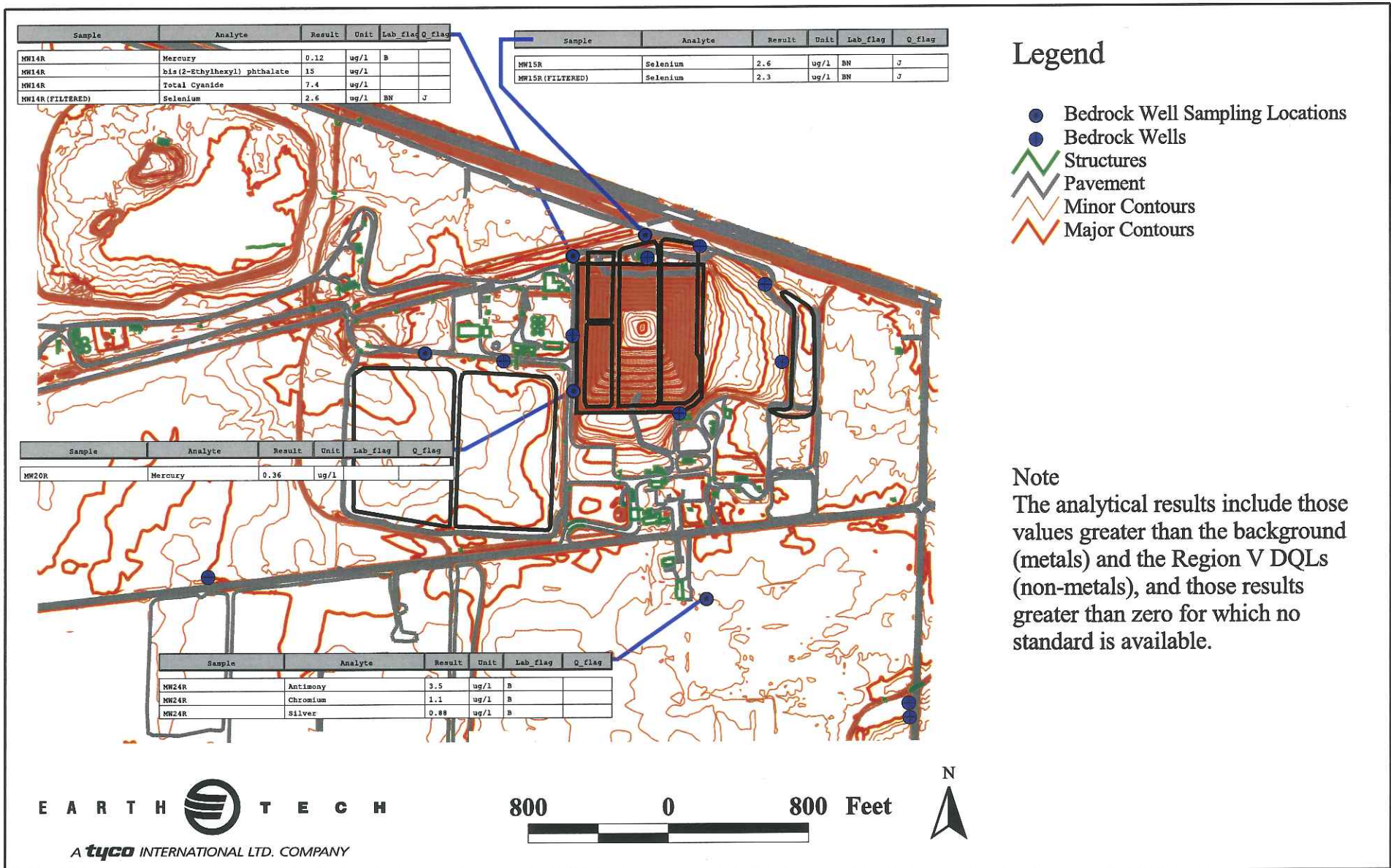


Figure 5-3.2c

Solid Waste Management Unit Group B (Lacustrine Wells) Analytical Results Map

Waste Management of Ohio - Vickery

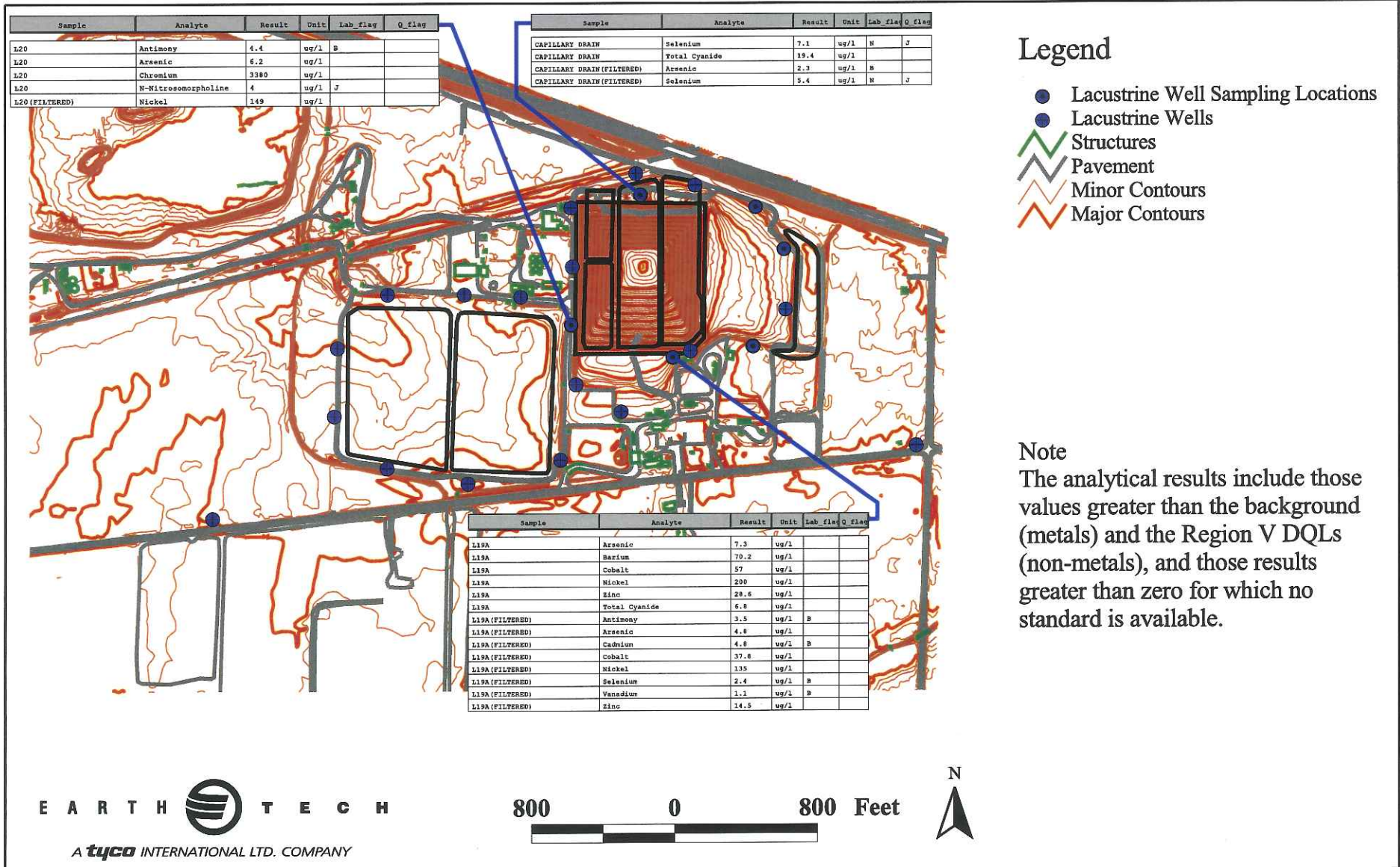


Figure 5-3.2d

Solid Waste Management Unit Group B (Lacustrine Wells) Analytical Results Map

Waste Management of Ohio - Vickery

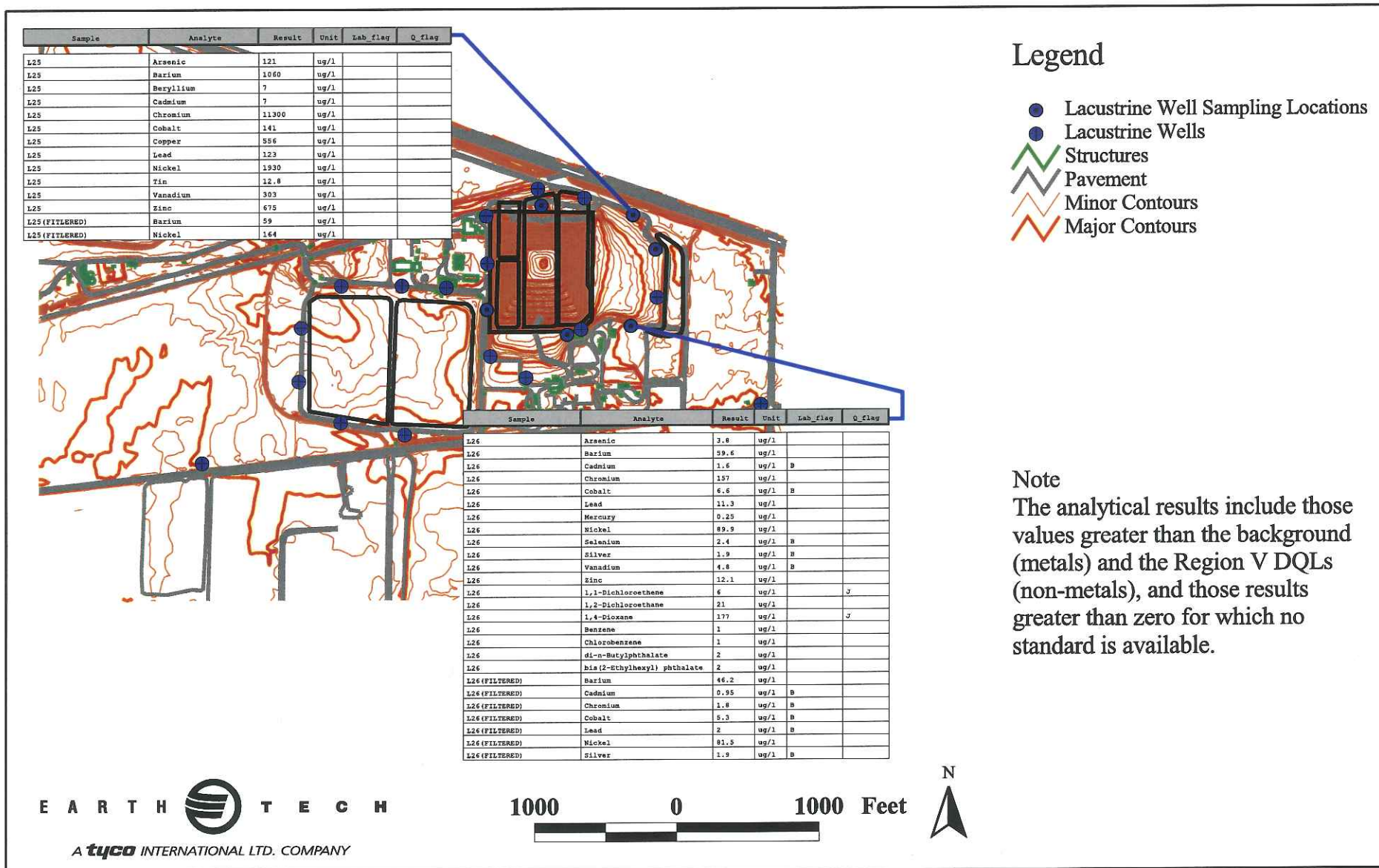
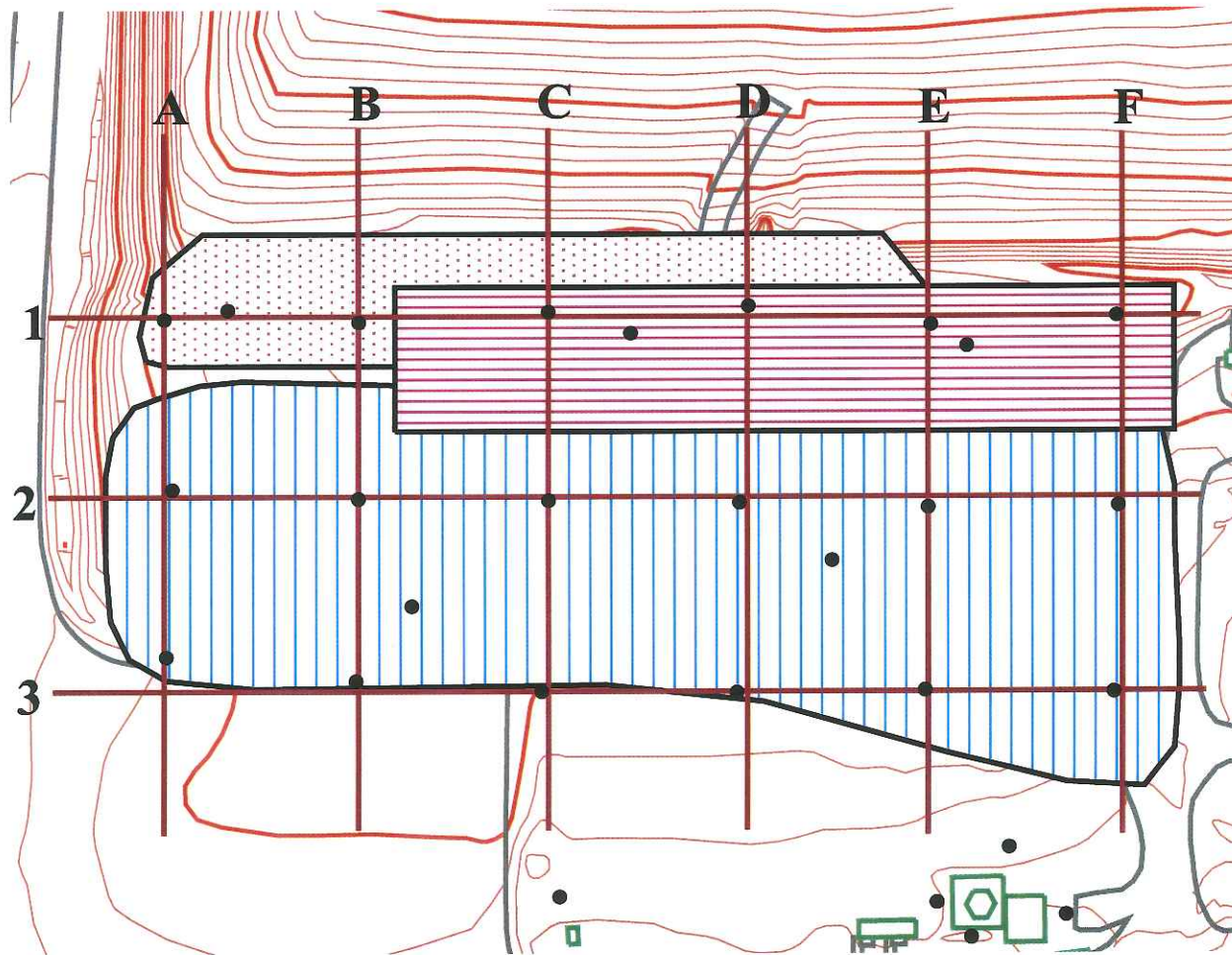


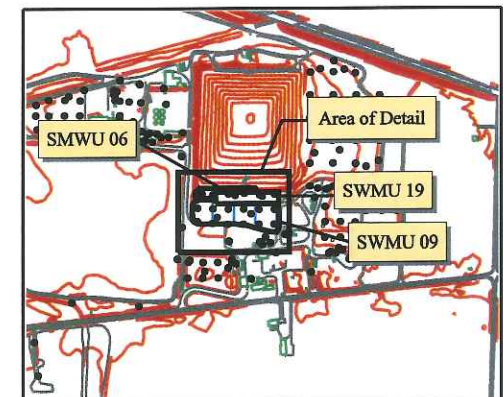
Figure 5-3.3a
Solid Waste Management Unit Group C (06, 09 & 19) Location Map
Waste Management of Ohio - Vickery



Legend

- Sample Locations
- △ SWMUs 06,09 & 19 Grid
- ▨ SWMU 19
- ▤ SWMU 09
- ▤ SWMU 06
- ▭ Structures
- ▭ Pavement
- Minor Contours
- Major Contours

Key Map



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100 0 100 Feet



Figure 5-3.3b
Solid Waste Management Unit 06 Analytical Results Map
Waste Management of Ohio - Vickery

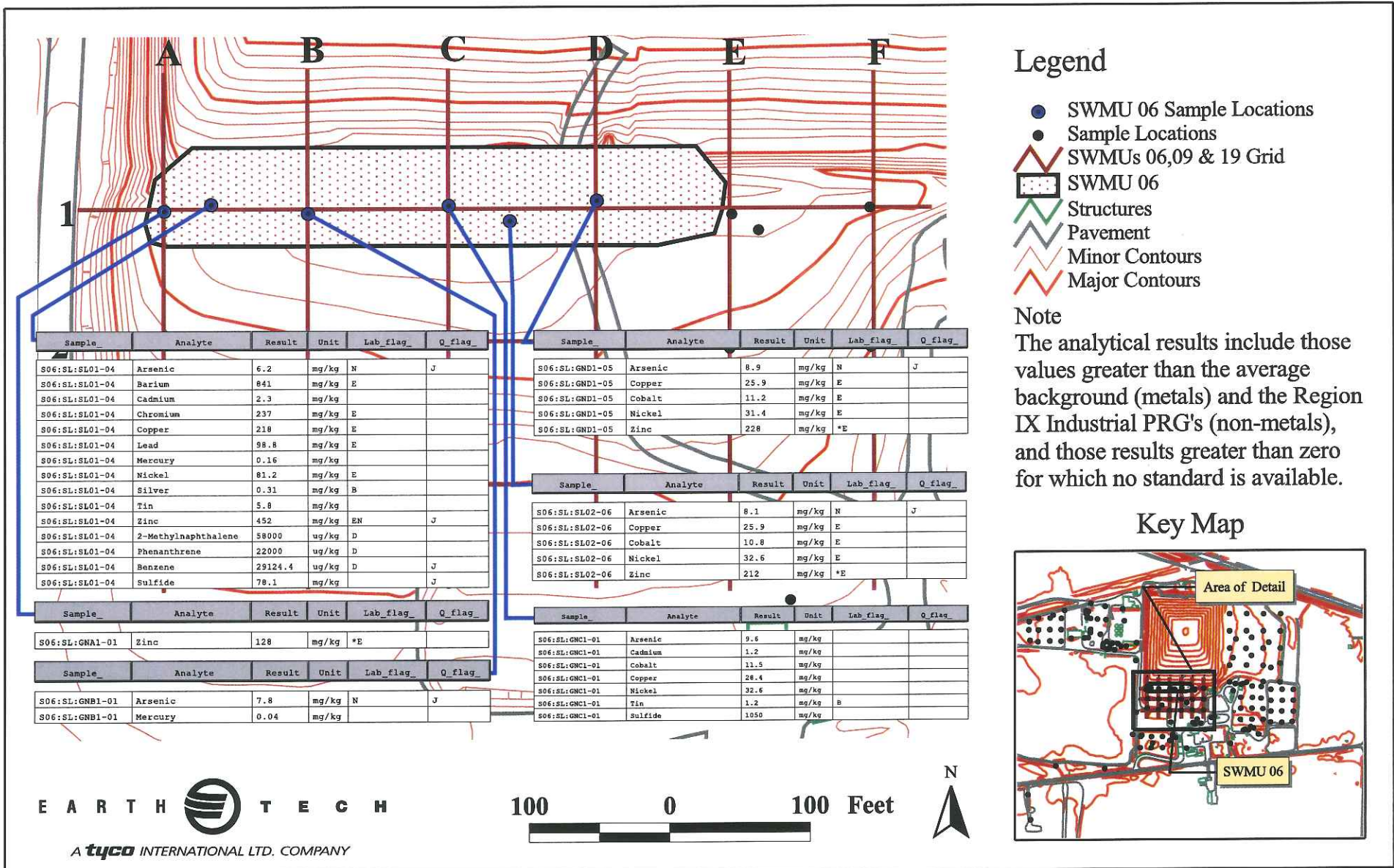
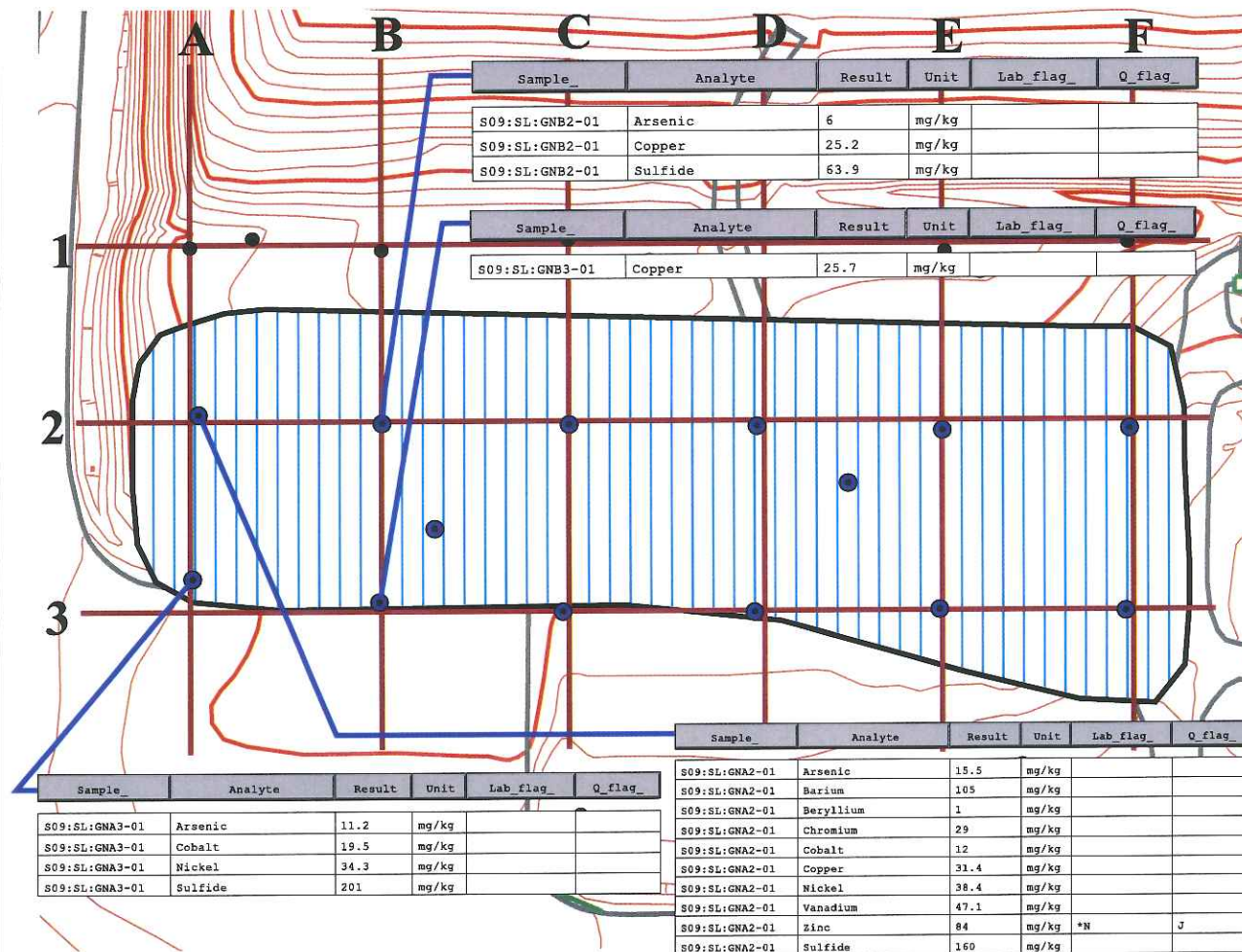


Figure 5-3.3c
Solid Waste Management Unit 09 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 09 Sampling Locations
- Sample Locations
- △ SWMUs 06,09 & 19 Grid
- SWMU 09
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

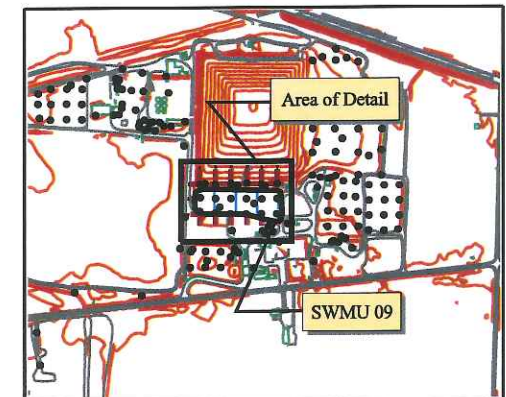


Figure 5-3.3d
Solid Waste Management Unit 09 Analytical Results Map
Waste Management of Ohio - Vickery

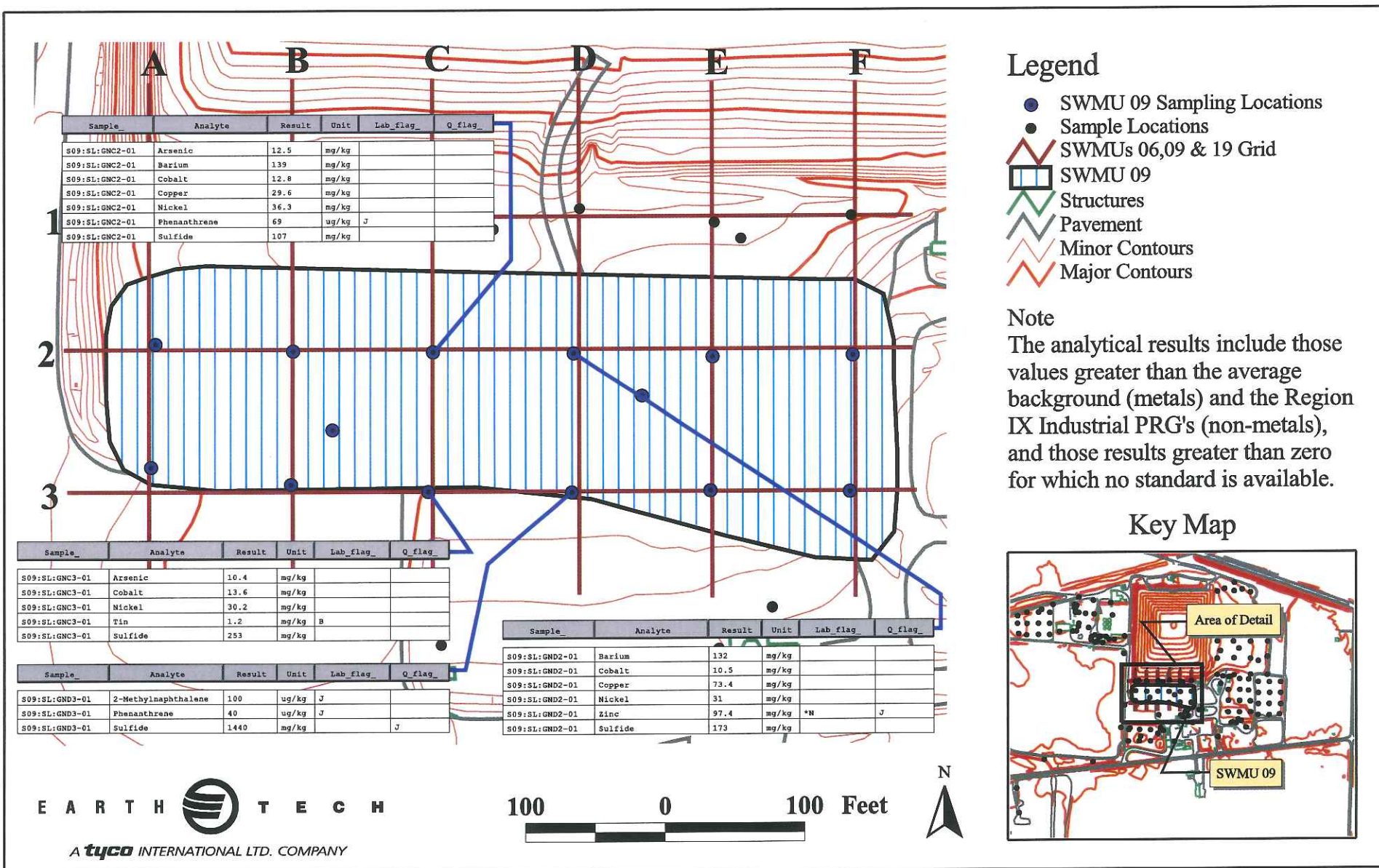
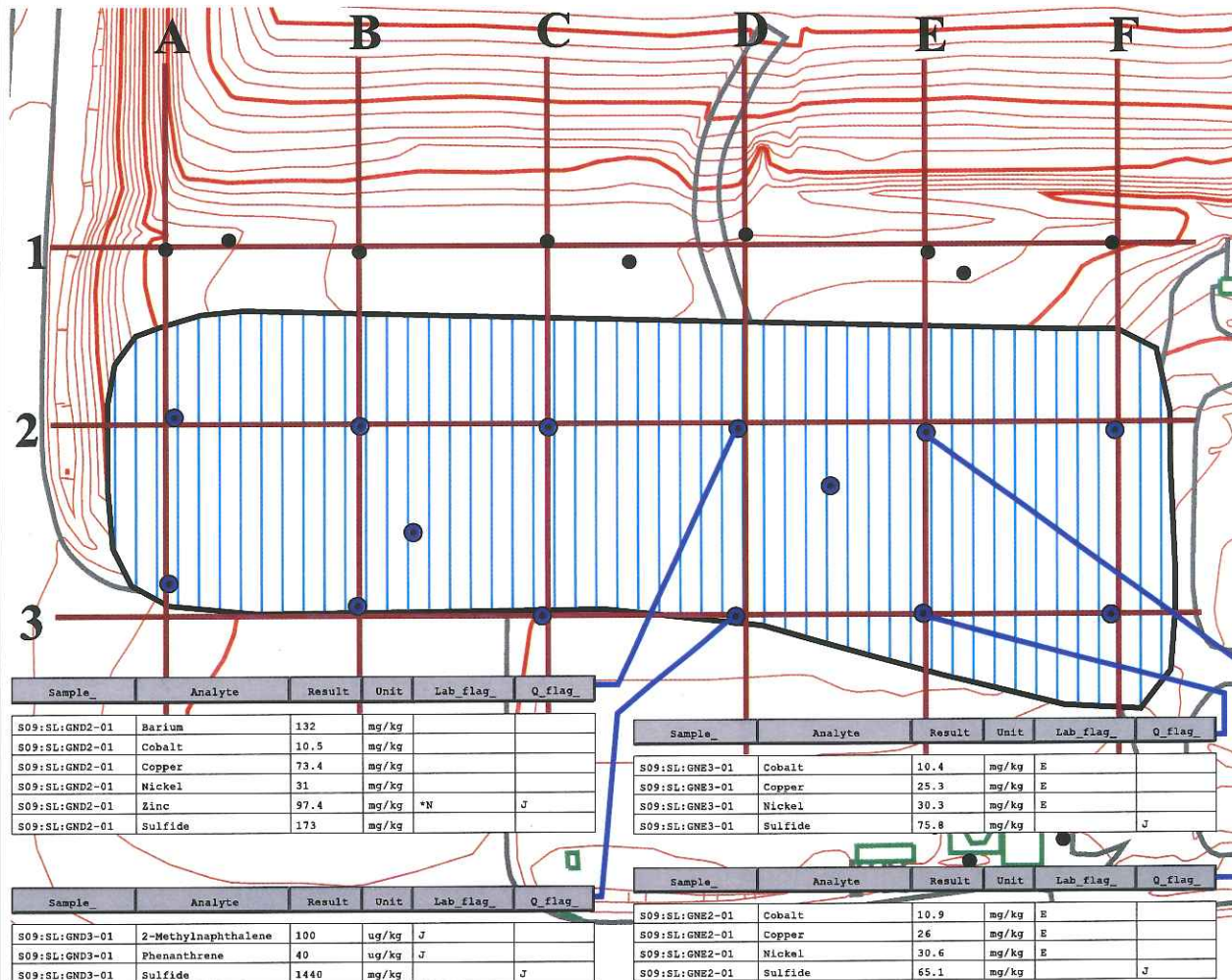


Figure 5-3.3e
Solid Waste Management Unit 09 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 09 Sampling Locations
- Sample Locations
- △ SWMUs 06,09 & 19 Grid
- SWMU 09
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

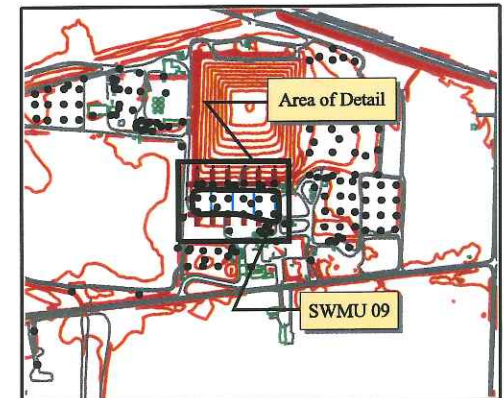
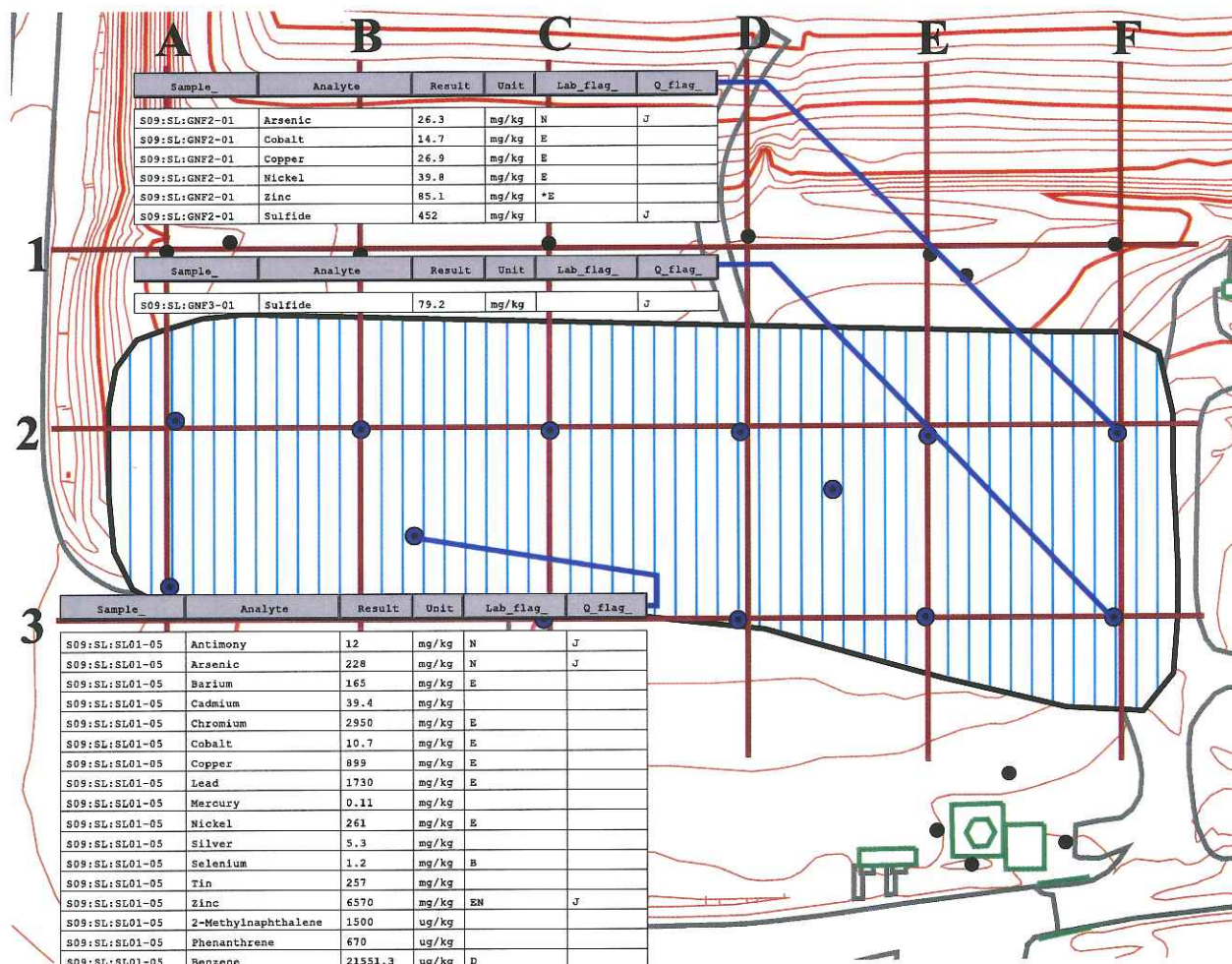


Figure 5-3.3f
Solid Waste Management Unit 09 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 09 Sampling Locations
- Sample Locations
- WMO SWMUs 06,09 & 19 Grid
- WMO SWMU 09
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

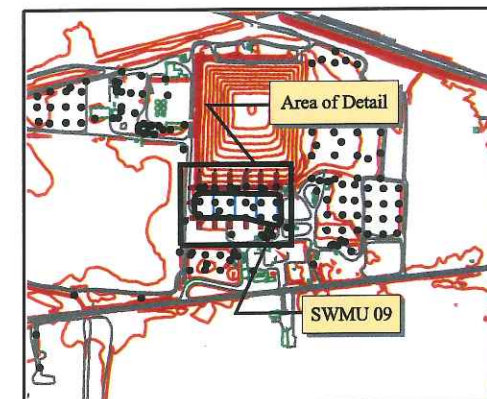


Figure 5-3.3g
Solid Waste Management Unit 09 Analytical Results Map
Waste Management of Ohio - Vickery

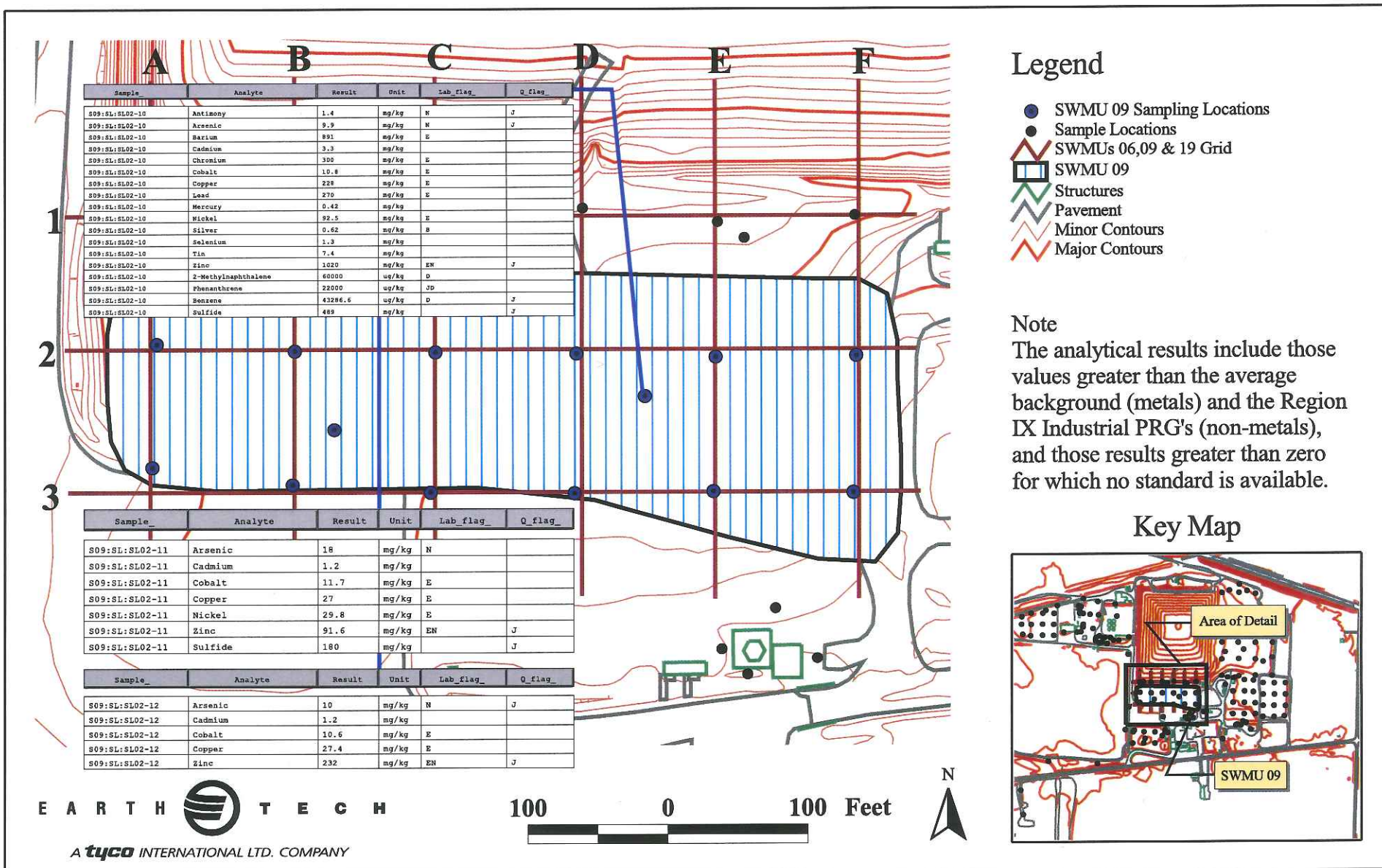


Figure 5-3.3h
Solid Waste Management Unit 19 Analytical Results Map
Waste Management of Ohio - Vickery

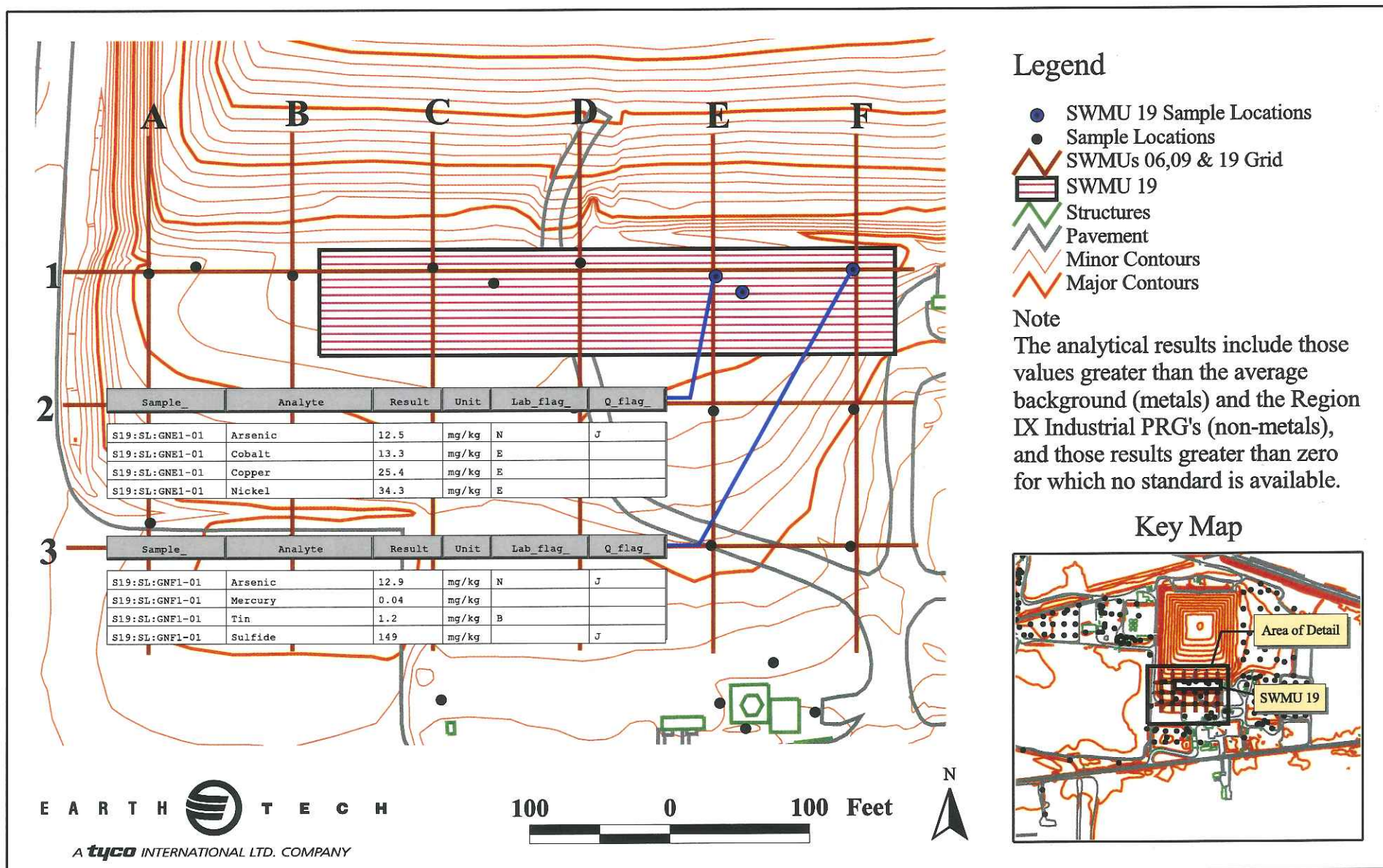


Figure 5-3.4a
Solid Waste Management Unit Group D (12, 13 & 14) Location Map
Waste Management of Ohio - Vickery



Figure 5-3.4b
Solid Waste Management Unit 12 Analytical Results Map
Waste Management of Ohio - Vickery

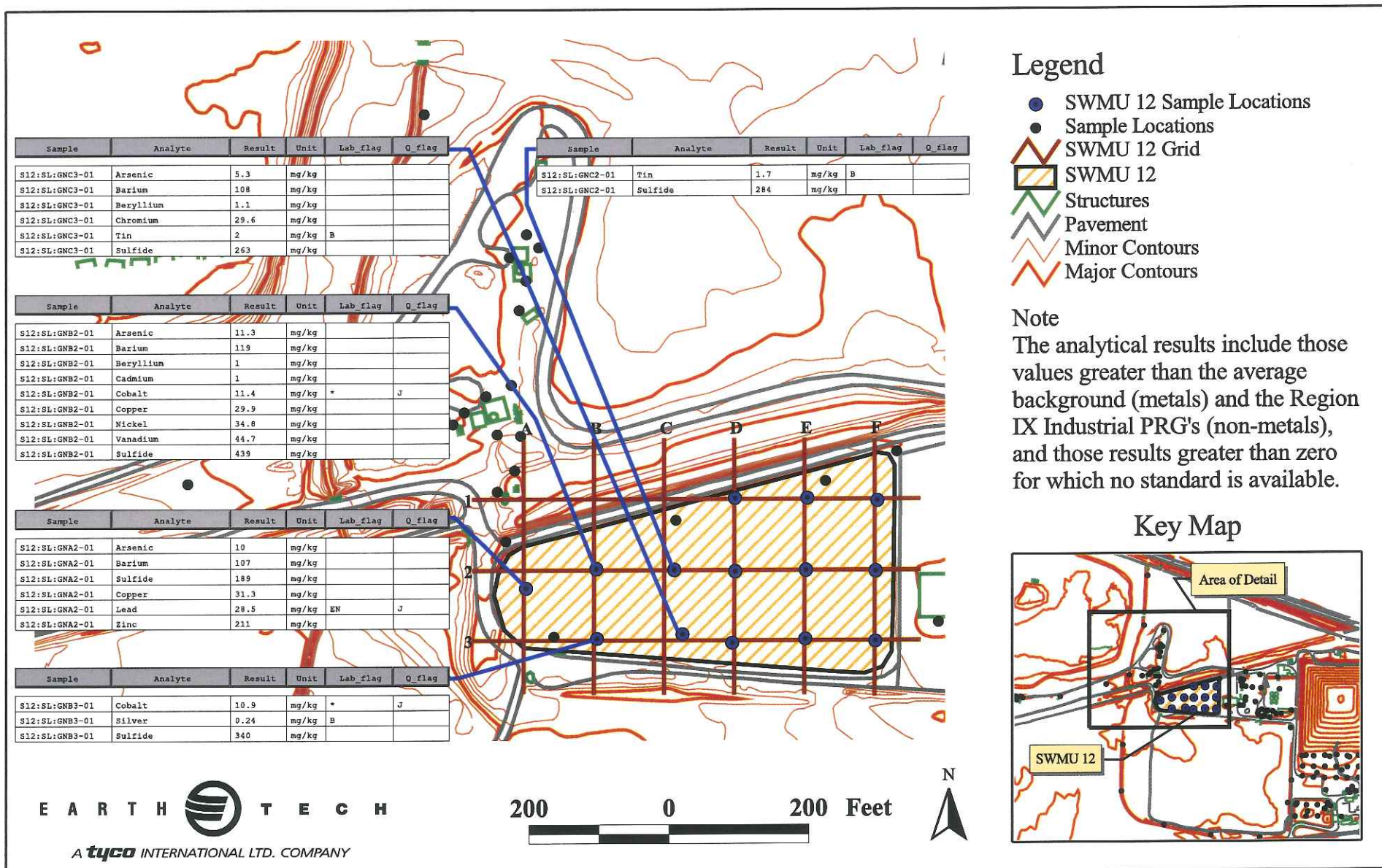


Figure 5-3.4c
Solid Waste Management Unit 12 Analytical Results Map
Waste Management of Ohio - Vickery

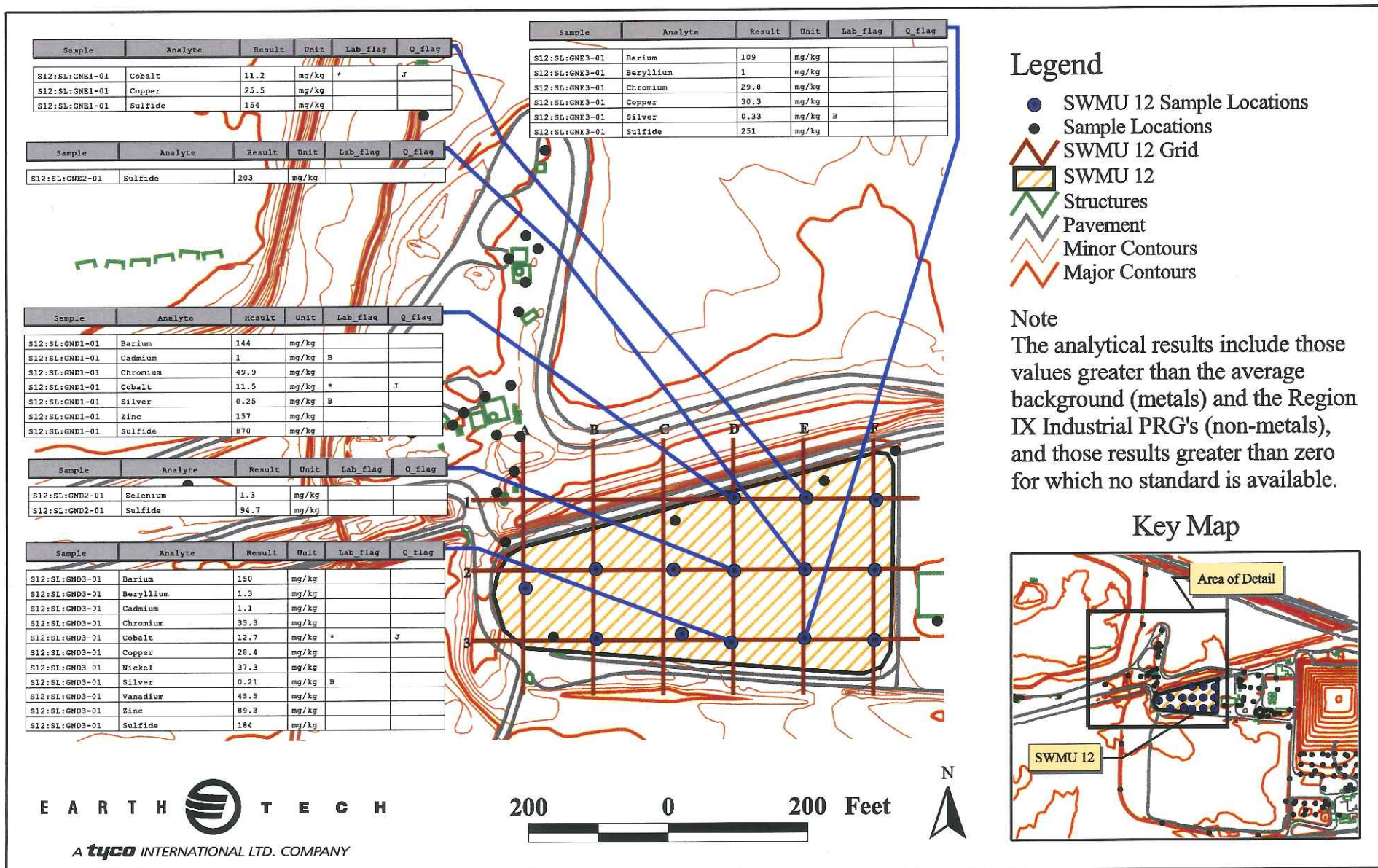


Figure 5-3.4d
Solid Waste Management Unit 12 Analytical Results Map
Waste Management of Ohio - Vickery

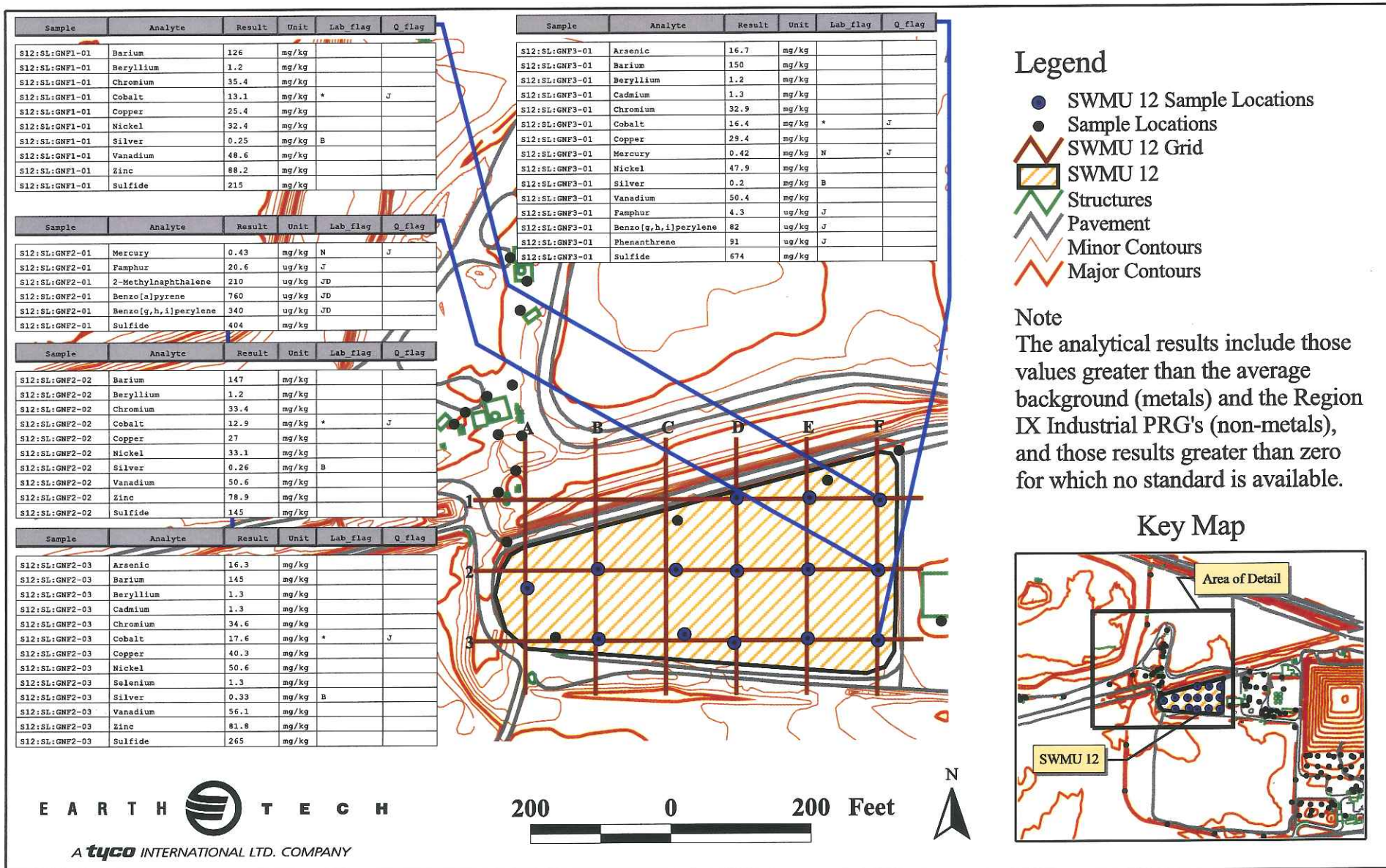
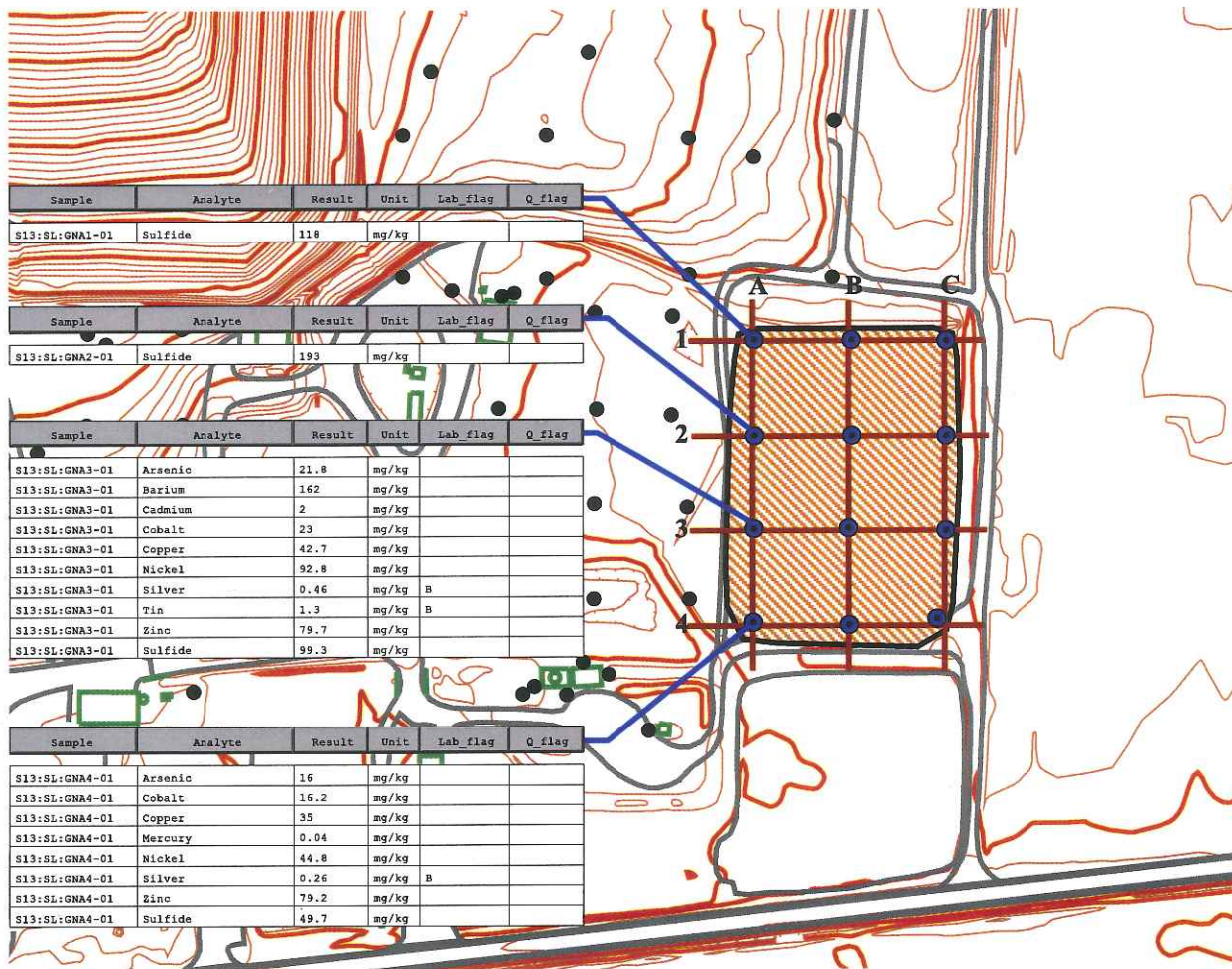


Figure 5 3.4e
Solid Waste Management Unit 13 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 13 Sample Locations
- Sample Locations
- ⬢ SWMU 13 Grid
- ▨ SWMU 13
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

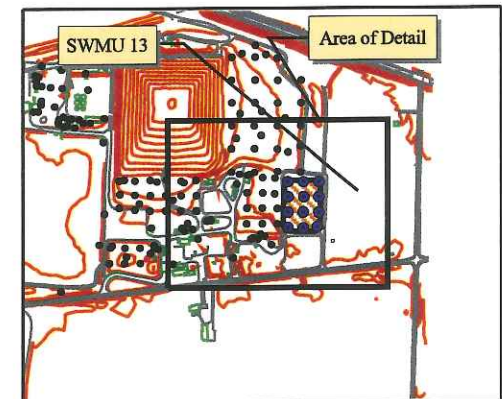


Figure 5-3.4f
Solid Waste Management Unit 13 Analytical Results Map
Waste Management of Ohio - Vickery

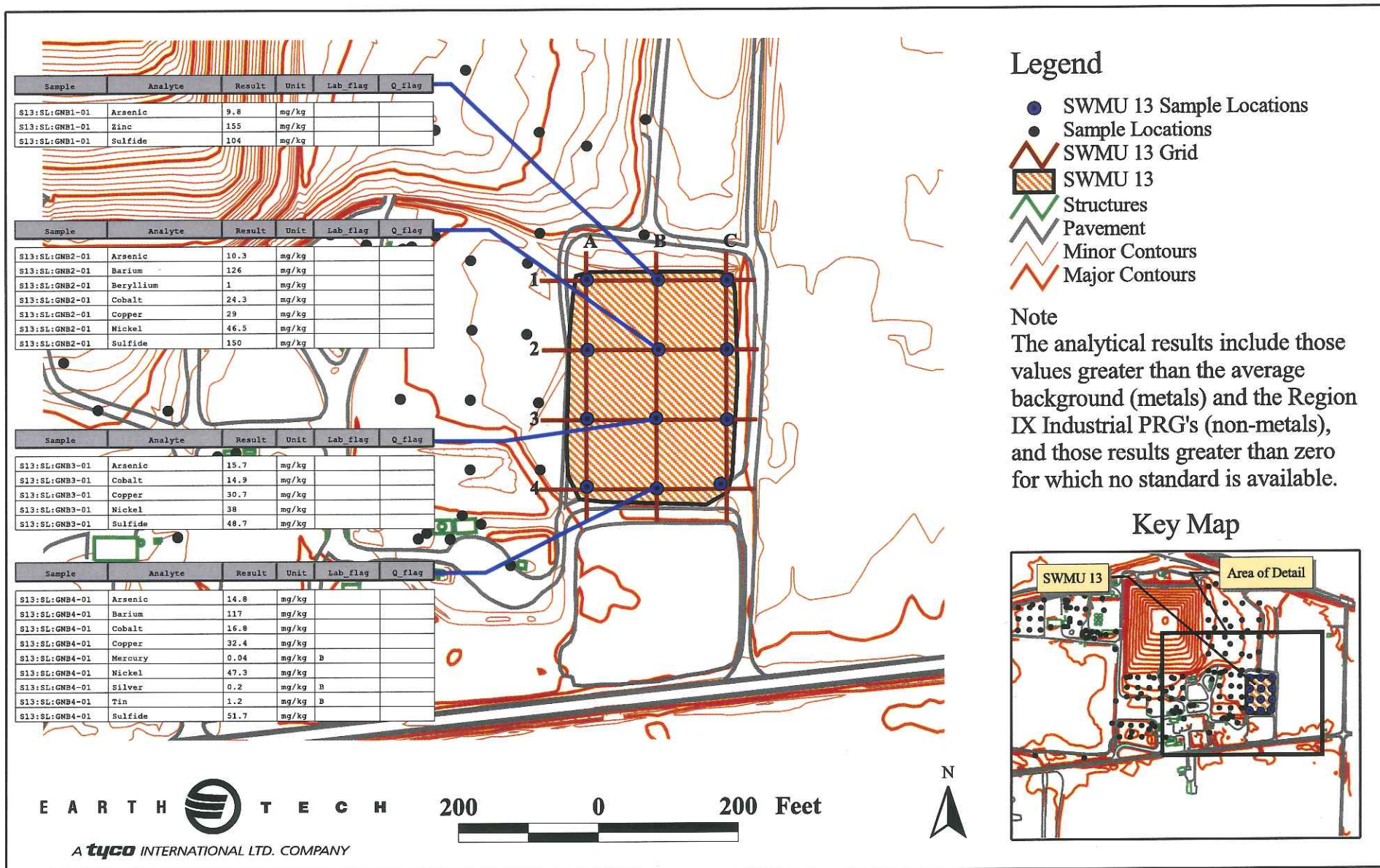
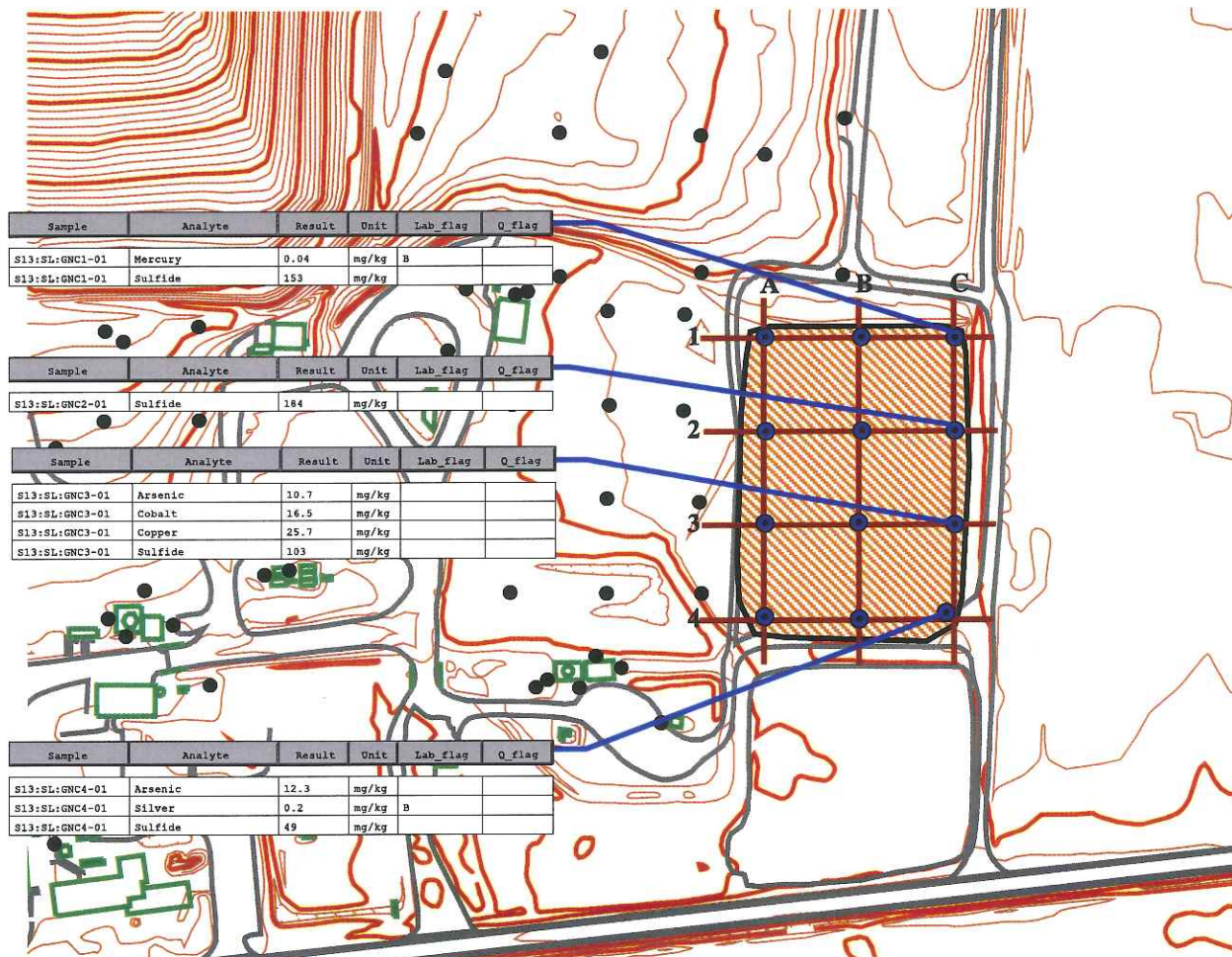


Figure 5-3.4g
Solid Waste Management Unit 13 Analytical Results Map
Waste Management of Ohio - Vickery



Legend

- SWMU 13 Sample Locations
- Sample Locations
- ▤ SWMU 13 Grid
- ▨ SWMU 13
- ▭ Structures
- ▭ Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

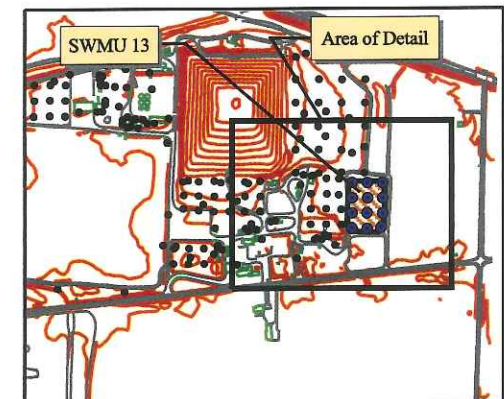


Figure 5-3.4h

Solid Waste Management Unit 14 Analytical Results Map

Waste Management of Ohio - Vickery

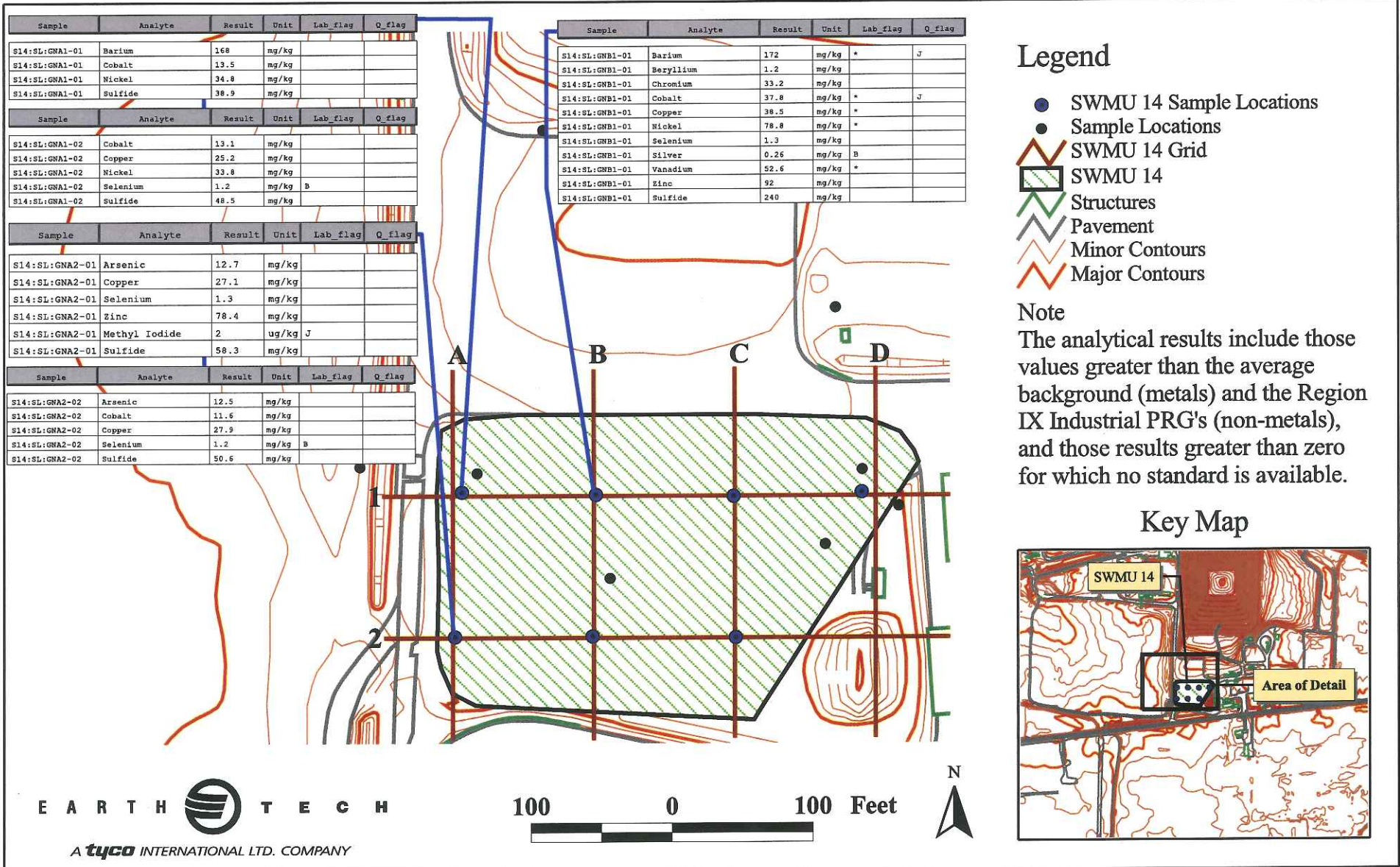


Figure 5-3.4i
Solid Waste Management Unit 14 Analytical Results Map
Waste Management of Ohio - Vickery

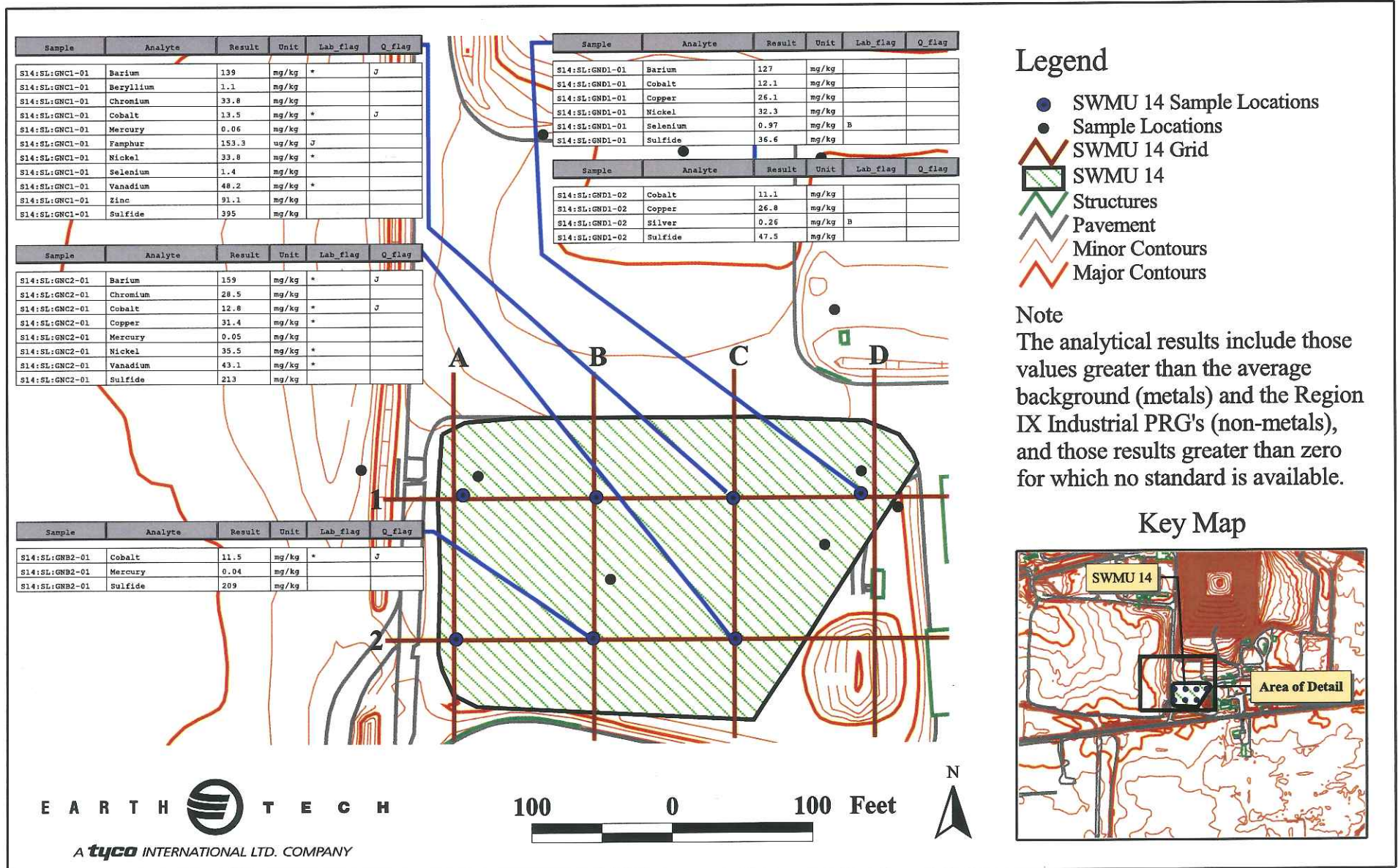


Figure 5-3.5a
Solid Waste Management Unit Group E (50, 51 & 52) Location Map
Waste Management of Ohio - Vickery



Figure 5-3.5b
Solid Waste Management Unit 50 Analytical Results Map
Waste Management of Ohio - Vickery

Sample_	Analyte	Result	Unit	Lab_flag_	Q_flag_
S50:SL:SF01-01	Barium	182	mg/kg	*N	J
S50:SL:SF01-01	Mercury	0.05	mg/kg		J
S50:SL:SF01-01	Benzo[g,h,i]perylene	180	ug/kg	J	
S50:SL:SF01-01	Phenanthrene	39	ug/kg	J	
S50:SL:SF01-01	Sulfide	143	mg/kg		J

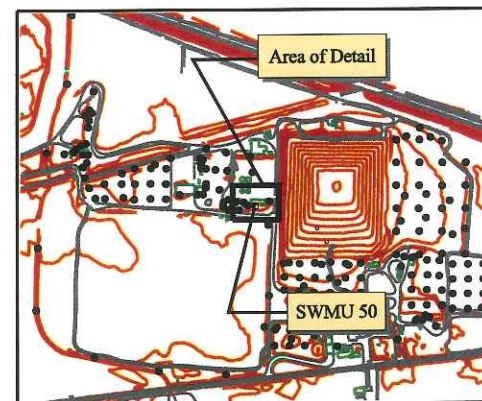
Legend

- SWMU 50 Sample Location
- Sample Locations
- ⊕ SWMU 50 Former Injection Well
- ▨ SWMU 50
- ▧ Structures
- ▧ Pavement
- ▧ Minor Contours
- ▧ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



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50 0 50 Feet



Figure 5-3.5c
Solid Waste Management Unit 51 Analytical Results Map
Waste Management of Ohio - Vickery

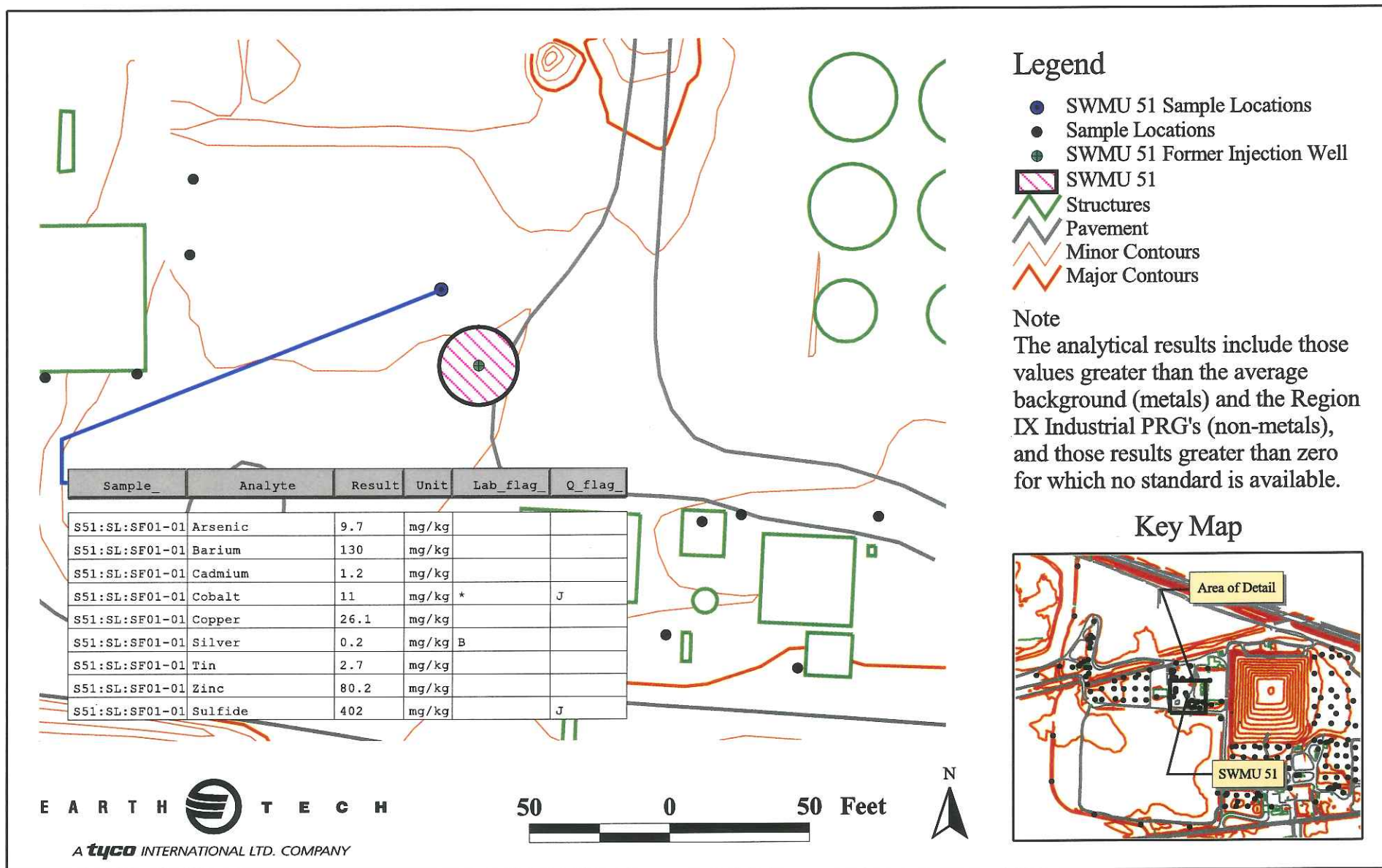
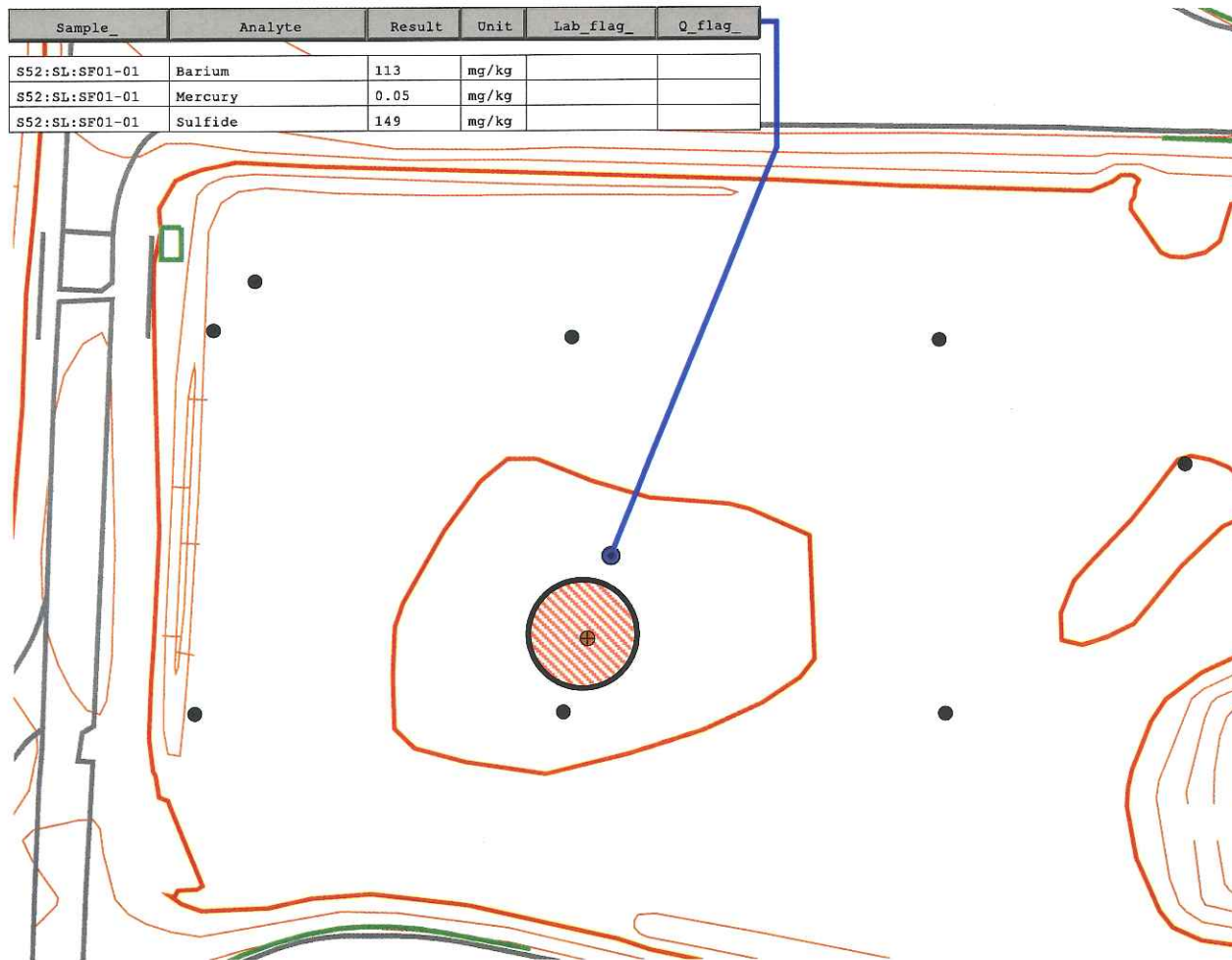


Figure 5-3.5d
Solid Waste Management Unit 52 Analytical Results Map
Waste Management of Ohio - Vickery

Sample_	Analyte	Result	Unit	Lab_flag_	Q_flag_
S52:SL:SF01-01	Barium	113	mg/kg		
S52:SL:SF01-01	Mercury	0.05	mg/kg		
S52:SL:SF01-01	Sulfide	149	mg/kg		



Legend

- SWMU 52 Sample Location
- Sample Locations
- SWMU 52 Former Injection Well
- ▨ SWMU 52
- ✓ Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

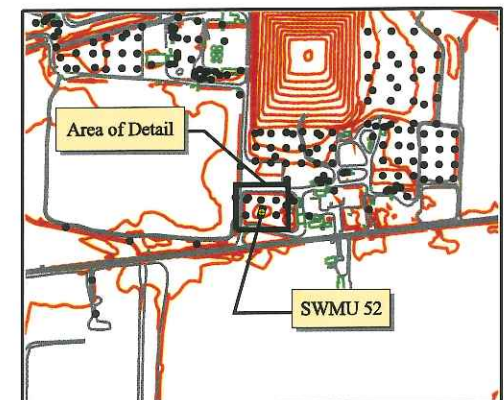


Figure 5-3.6a

Solid Waste Management Unit Group F (31, 32, 33, 34, 35, 36, 37, 38, 39 & 40) Location Map
Waste Management of Ohio - Vickery

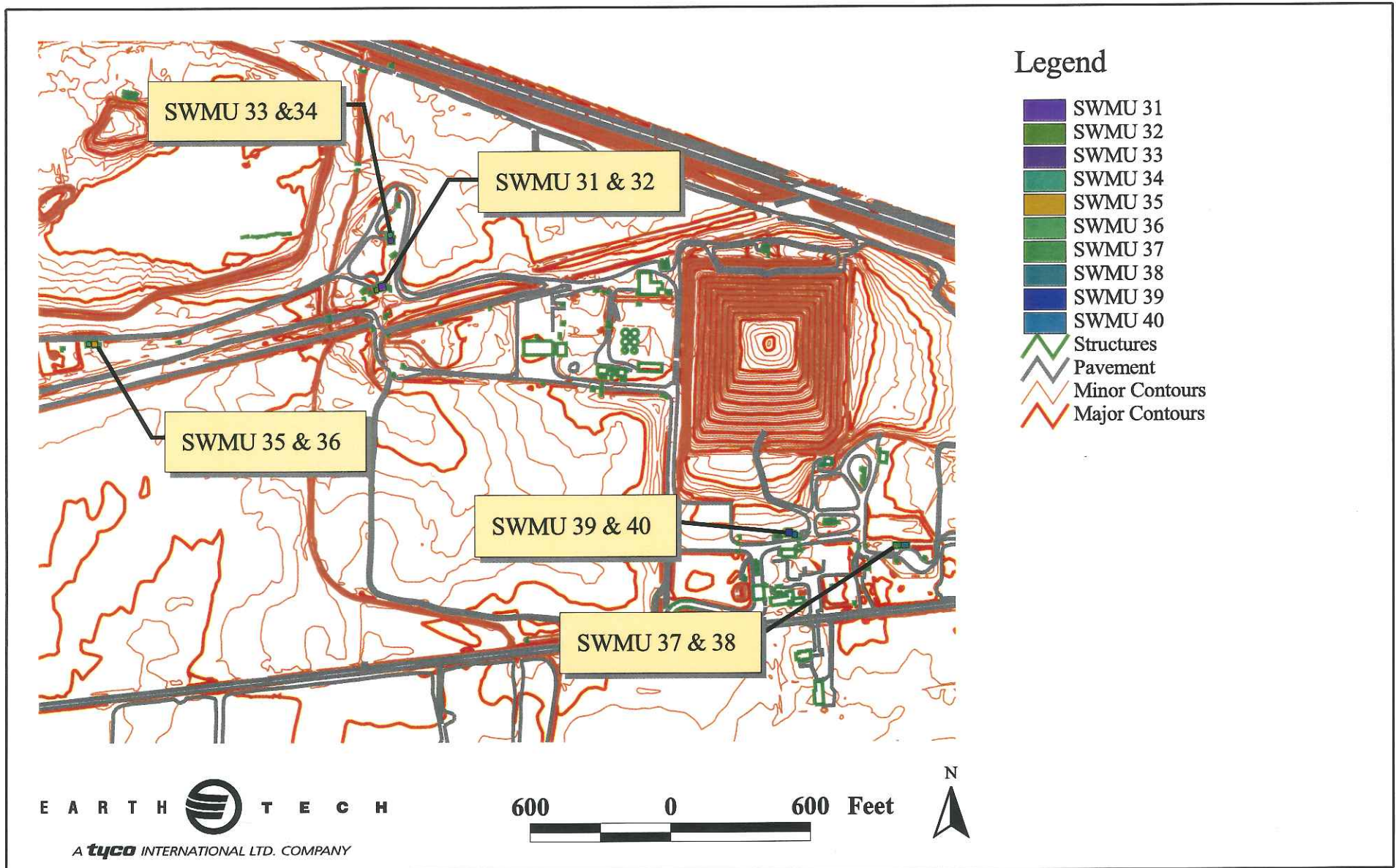


Figure 5-3.6b
Solid Waste Management Units 31 & 32 Analytical Results Map
Waste Management of Ohio - Vickery

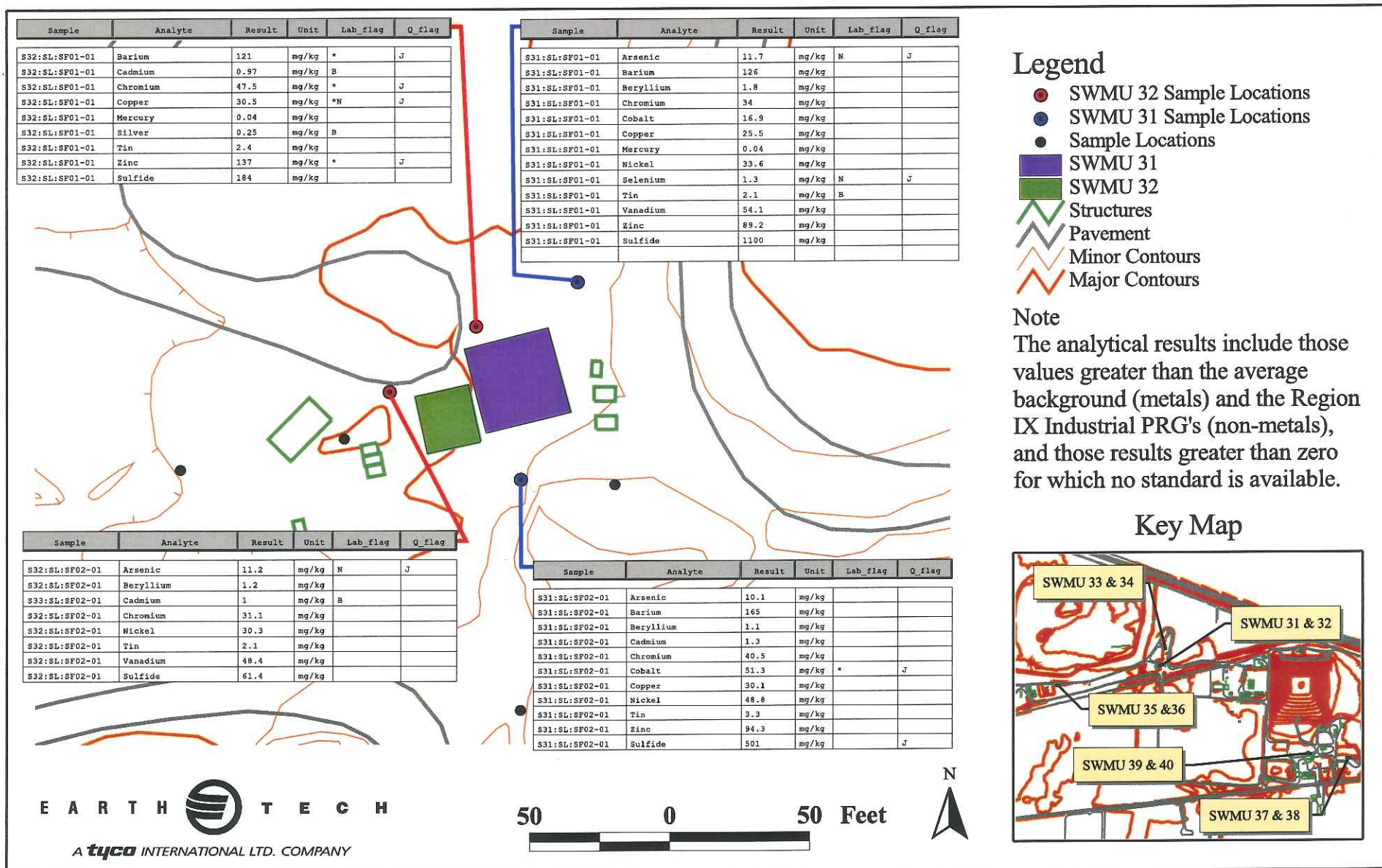


Figure 5-3.6c
Solid Waste Management Units 33 & 34 Analytical Results Map
Waste Management of Ohio - Vickery

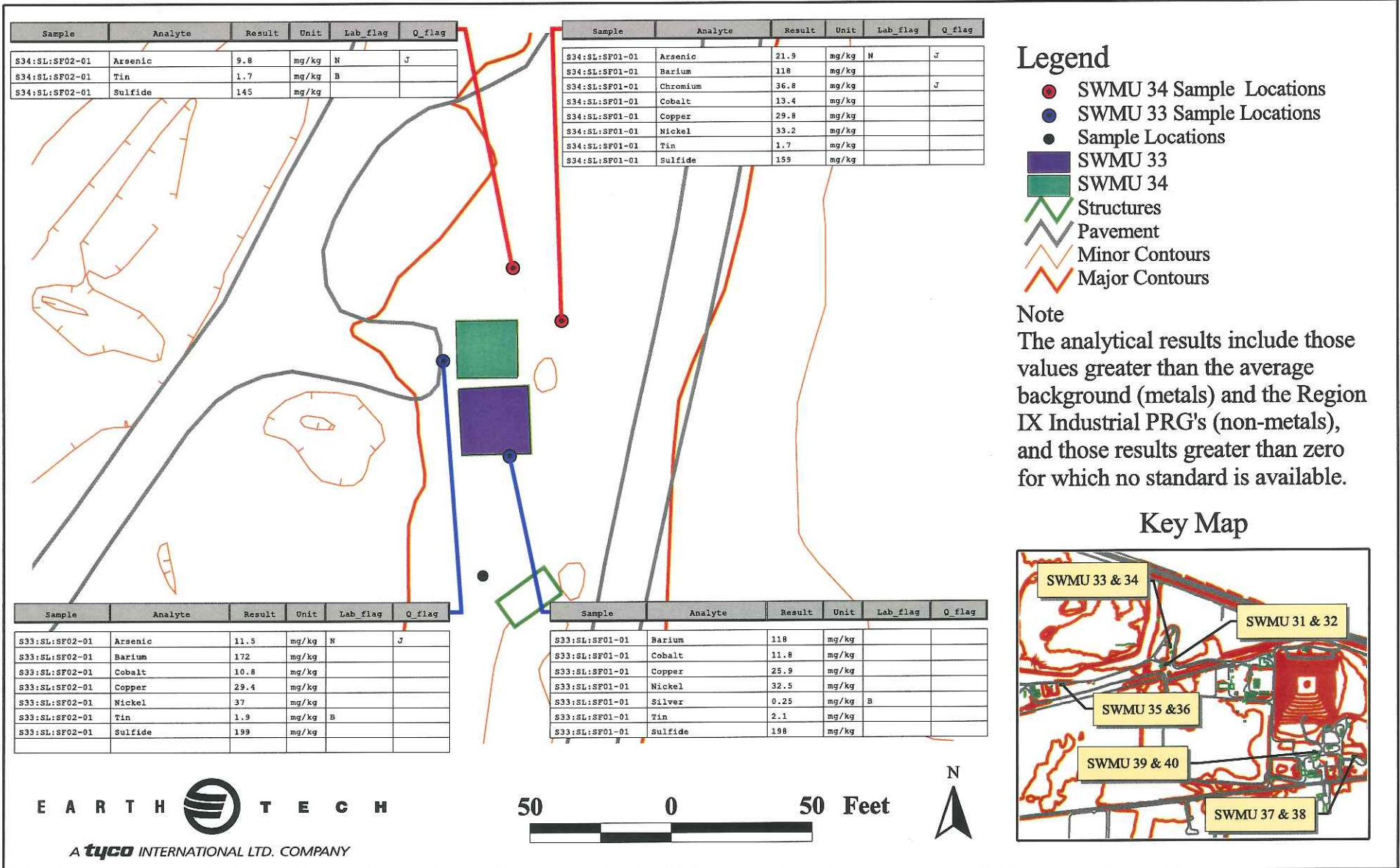


Figure 5-3.6d
Solid Waste Management Units 35 & 36 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S36:SL:SF01-01	Barium	155	mg/kg		
S36:SL:SF01-01	Cobalt	10.3	mg/kg		
S36:SL:SF01-01	Tin	2.3	mg/kg		
S36:SL:SF01-01	Zinc	90.6	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S35:SL:SF01-01	Barium	110	mg/kg		
S35:SL:SF01-01	Beryllium	1	mg/kg		
S35:SL:SF01-01	Cobalt	11.1	mg/kg		
S35:SL:SF01-01	Tin	1.7	mg/kg	B	
S35:SL:SF01-01	Vanadium	42.8	mg/kg		
S35:SL:SF01-01	Sulfide	137	mg/kg		

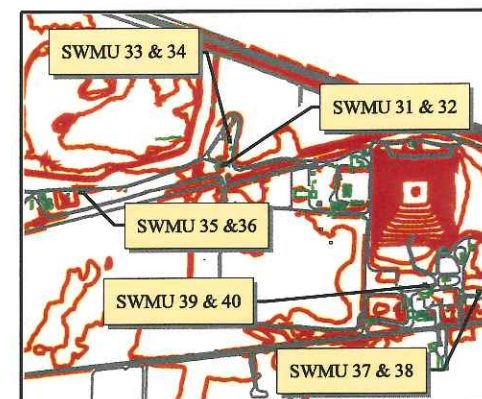
Legend

- SWMU 36 Sample Locations
- SWMU 35 Sample Locations
- Sample Locations
- SWMU 35
- SWMU 36
- ▤ Structures
- ▤ Pavement
- ▤ Minor Contours
- ▤ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S36:SL:SF02-01	Mercury	0.04	mg/kg	B	
S36:SL:SF02-01	Tin	1.7	mg/kg	B	
S36:SL:SF02-01	Aroclor 1260	30	ug/kg	J	
S36:SL:SF02-01	Sulfide	113	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S35:SL:SF02-01	Arsenic	10.4	mg/kg		
S35:SL:SF02-01	Cadmium	1.2	mg/kg		
S35:SL:SF02-01	Copper	30.8	mg/kg		
S35:SL:SF02-01	Lead	33.5	mg/kg	N	J
S35:SL:SF02-01	Mercury	0.15	mg/kg		
S35:SL:SF02-01	Tin	2.8	mg/kg		
S35:SL:SF02-01	Zinc	129	mg/kg		
S35:SL:SF02-01	Sulfide	458	mg/kg		J



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50 0 50 Feet



Figure 5-3.6e
Solid Waste Management Units 37 & 38 Analytical Results Map
Waste Management of Ohio - Vickery

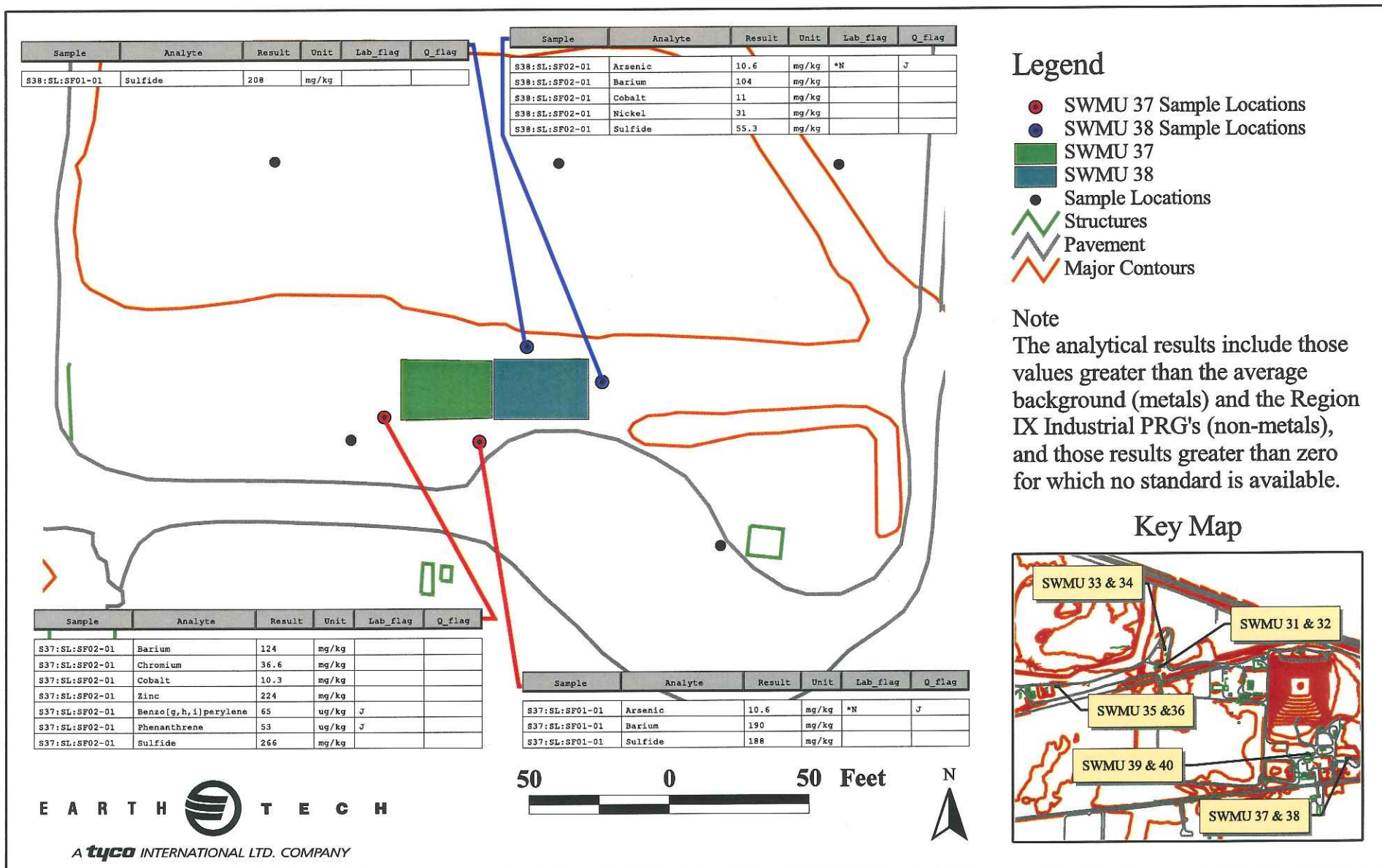


Figure 5-3.6f
Solid Waste Management Units 39 & 40 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S40:SL:SF01-01	Barium	105	mg/kg		
S40:SL:SF01-01	Cobalt	11.1	mg/kg	J	
S40:SL:SF01-01	Copper	25.5	mg/kg		
S40:SL:SF01-01	Mercury	0.06	mg/kg	J	
S40:SL:SF01-01	Nickel	32.5	mg/kg	J	
S40:SL:SF01-01	Sulfide	113	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S39:SL:SF02-01	Mercury	0.04	mg/kg		
S39:SL:SF02-01	Zinc	79.5	mg/kg		
S39:SL:SF02-01	Sulfide	425	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S40:SL:SF02-01	Copper	44.5	mg/kg		
S40:SL:SF02-01	Mercury	0.08	mg/kg		
S40:SL:SF02-01	Zinc	120	mg/kg		
S40:SL:SF02-01	Sulfide	121	mg/kg	J	

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S39:SL:SF01-01	Arsenic	10.8	mg/kg	*N	J
S39:SL:SF01-01	Barium	141	mg/kg		
S39:SL:SF01-01	Beryllium	1.1	mg/kg		
S39:SL:SF01-01	Chromium	28.8	mg/kg		
S39:SL:SF01-01	Cobalt	14.5	mg/kg		
S39:SL:SF01-01	Copper	26.6	mg/kg		
S39:SL:SF01-01	Nickel	33.1	mg/kg		
S39:SL:SF01-01	Vanadium	44.3	mg/kg		
S39:SL:SF01-01	Zinc	78.8	mg/kg		
S39:SL:SF01-01	Phenanthrene	140	ug/kg	J	
S39:SL:SF01-01	Sulfide	97.4	mg/kg		

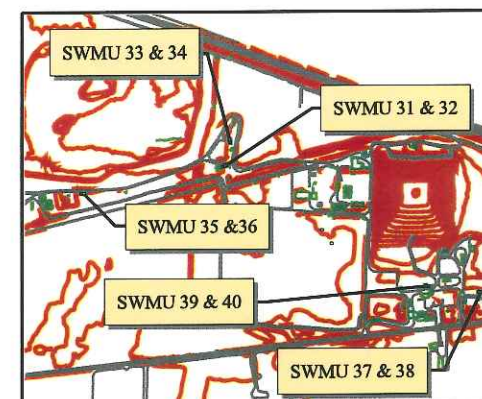
Legend

- SWMU 40 Sample Locations
- SWMU 39 Sample Locations
- SWMU 39
- SWMU 40
- Sample Locations
- ▧ Structures
- ▧ Pavement
- ▧ Minor Contours
- ▧ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



EARTH TECH

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50 0 50 Feet



Figure 5-3.7a
Solid Waste Management Unit Group G (23, 27, 29 & 30) Location Map
Waste Management of Ohio - Vickery

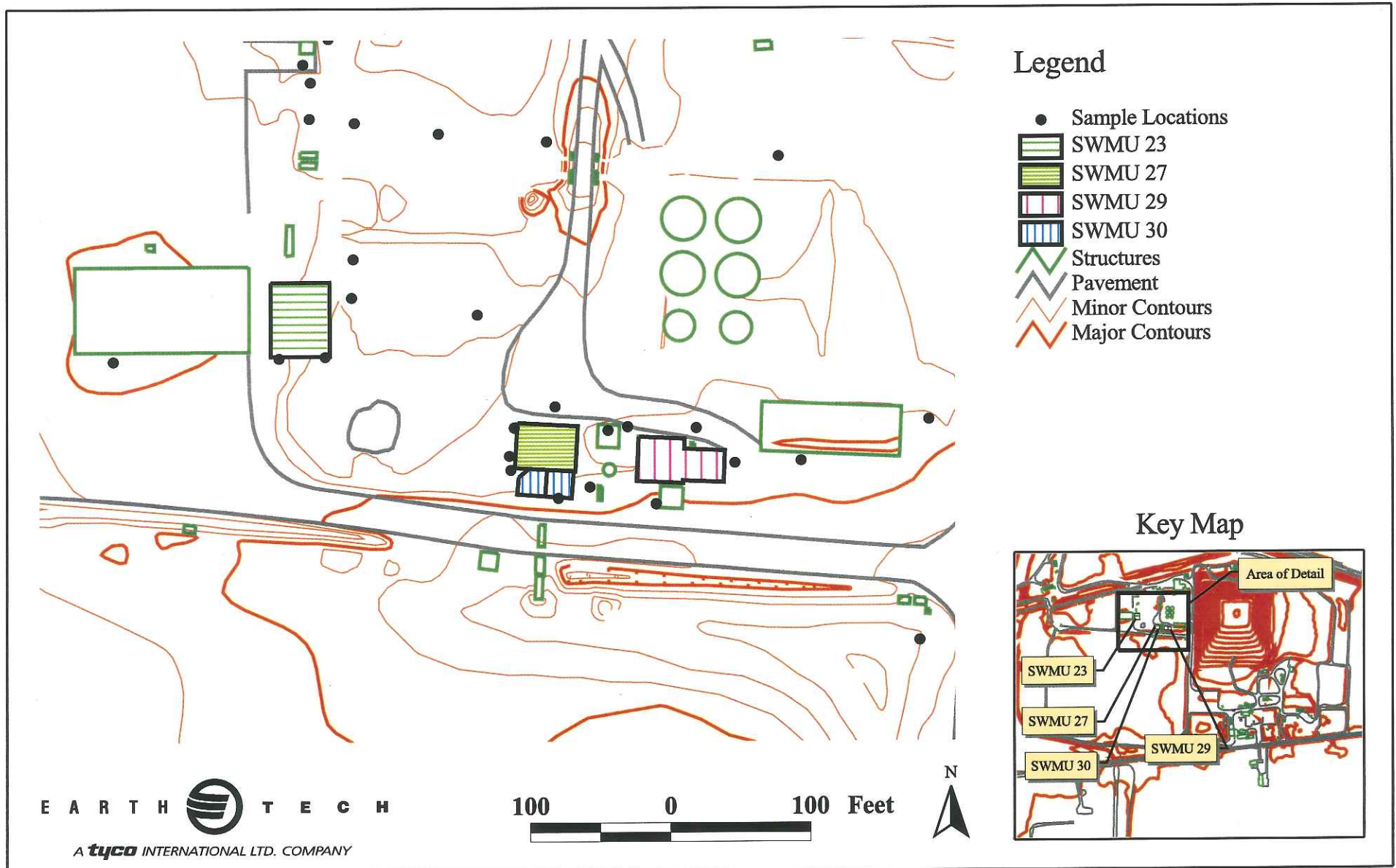


Figure 5-3.7b
Solid Waste Management Unit 23 Analytical Results Map
Waste Management of Ohio - Vickery

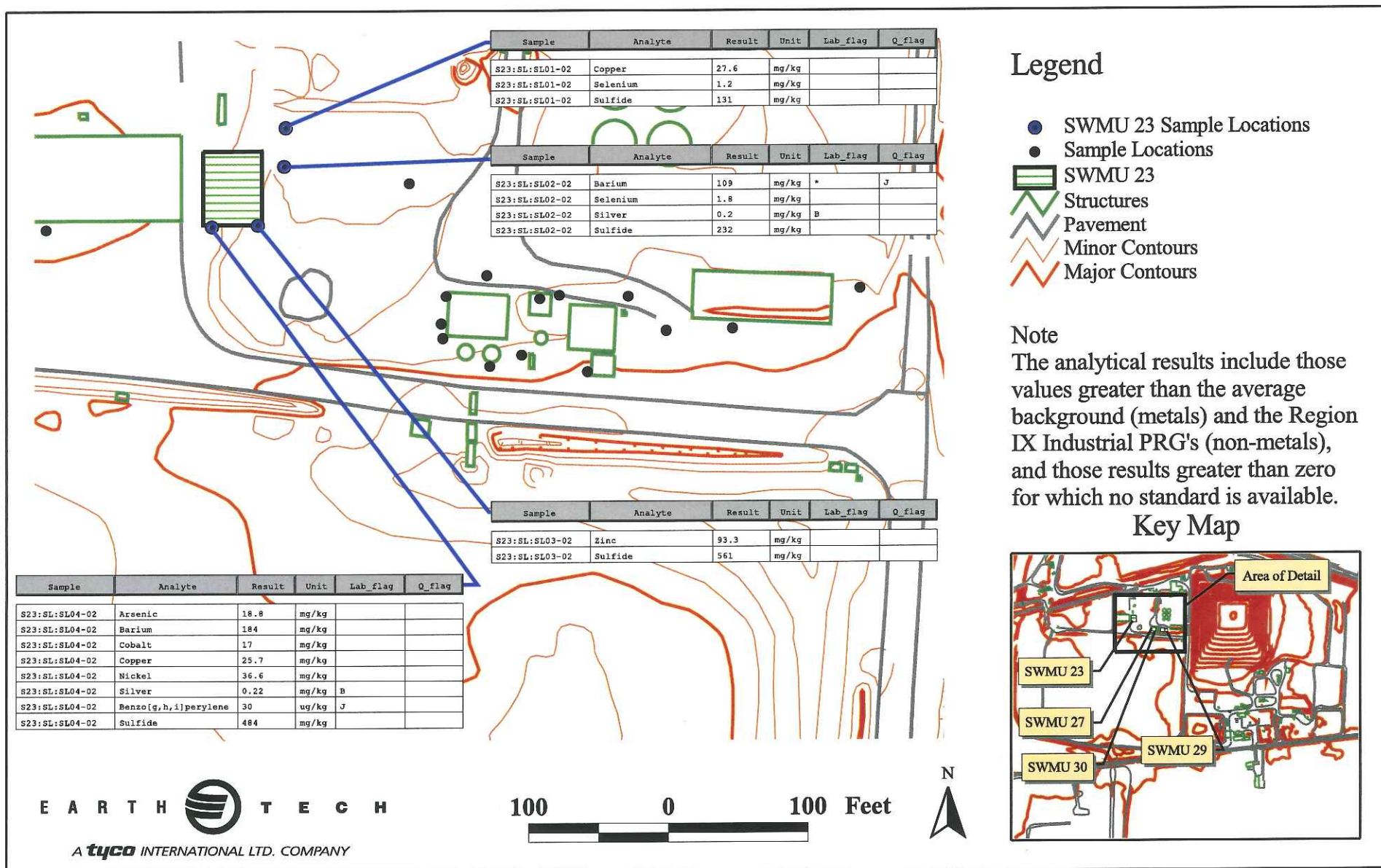


Figure 5-3.7c
Solid Waste Management Unit 27 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab flag	Q flag
S27:SL:SF02-01	Cadmium	2.3	mg/kg		
S27:SL:SF02-01	Mercury	0.14	mg/kg		
S27:SL:SF02-01	Tin	2.9	mg/kg		
S27:SL:SF02-01	Sulfide	250	mg/kg	J	

Sample	Analyte	Result	Unit	Lab flag	Q flag
S27:SL:SF03-01	Cadmium	1	mg/kg		
S27:SL:SF03-01	Tin	2.4	mg/kg		
S27:SL:SF03-01	Sulfide	372	mg/kg	J	

Sample	Analyte	Result	Unit	Lab flag	Q flag
S27:SL:SF01-01	Tin	2.3	mg/kg		
S27:SL:SF01-01	Sulfide	260	mg/kg	J	

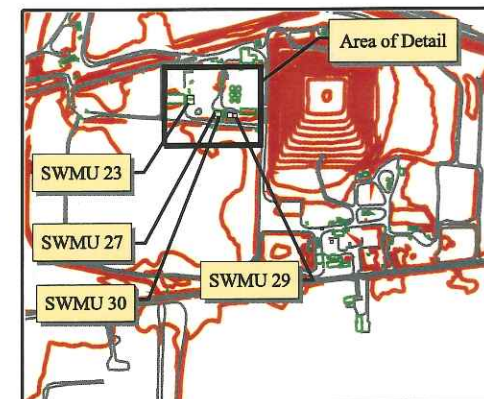
Legend

- SWMU 27 Sampling Locations
- Sample Locations
- SWMU 27
- ▤ Structures
- ▤ Pavement
- ~ Minor Contours
- ~ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



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100 0 100 Feet



Figure 5-3.7d
Solid Waste Management Unit 29 Analytical Results Map
Waste Management of Ohio - Vickery

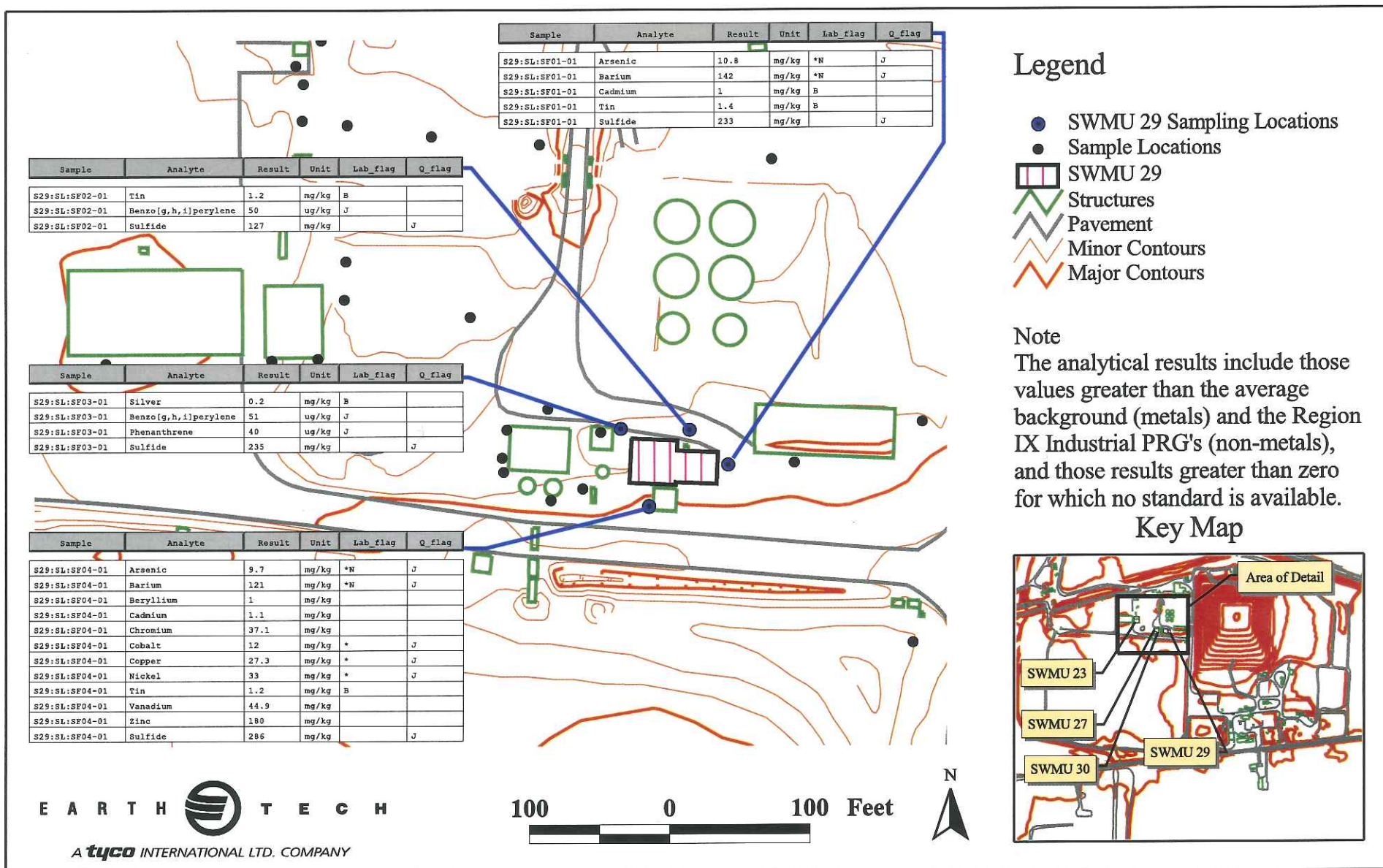


Figure 5-3.7e
Solid Waste Management Unit 30 Analytical Results Map
Waste Management of Ohio - Vickery

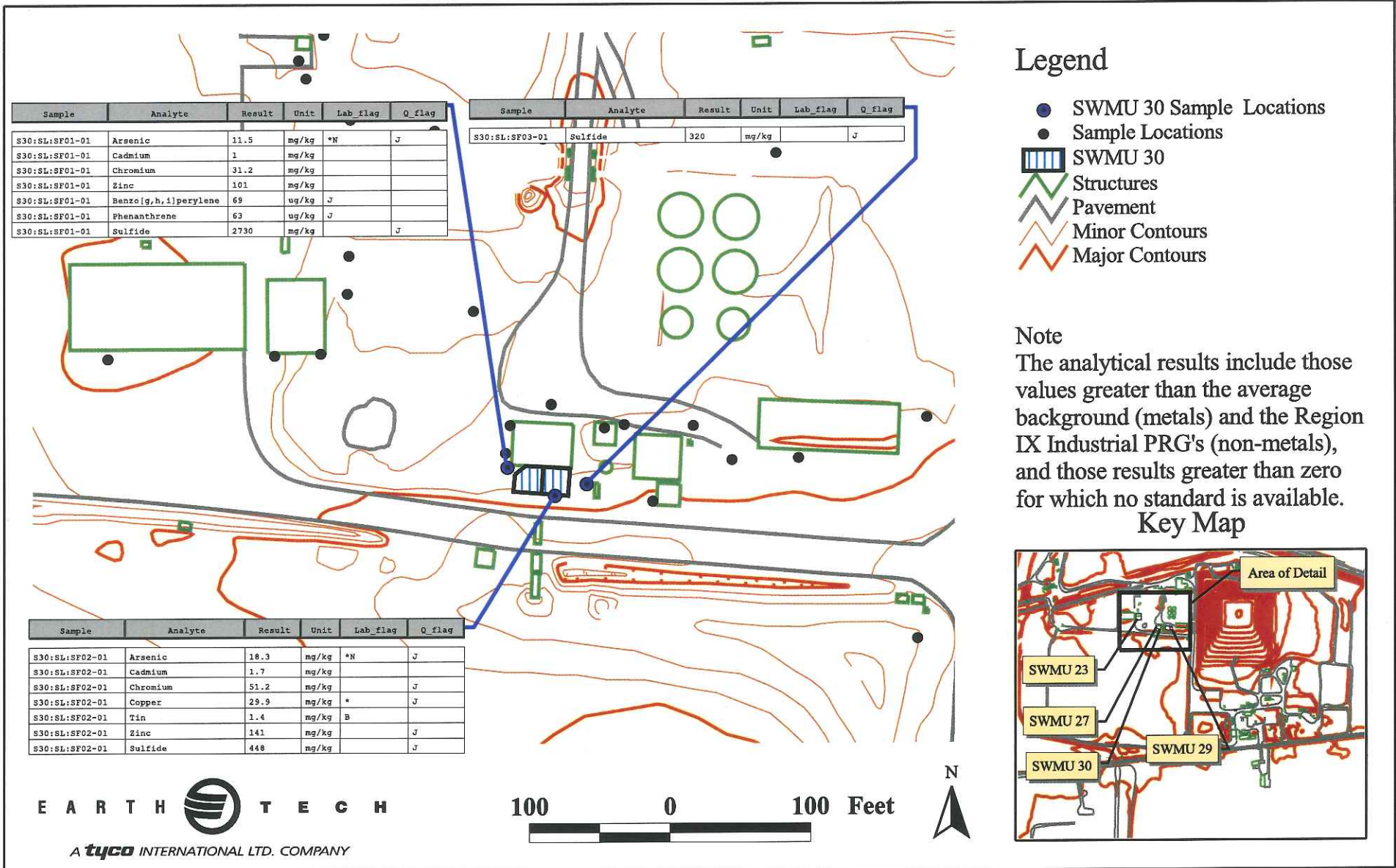


Figure 5-3.8a
Solid Waste Management Unit Group H (46, 47, 48 & 49) Location Map
Waste Management of Ohio - Vickery

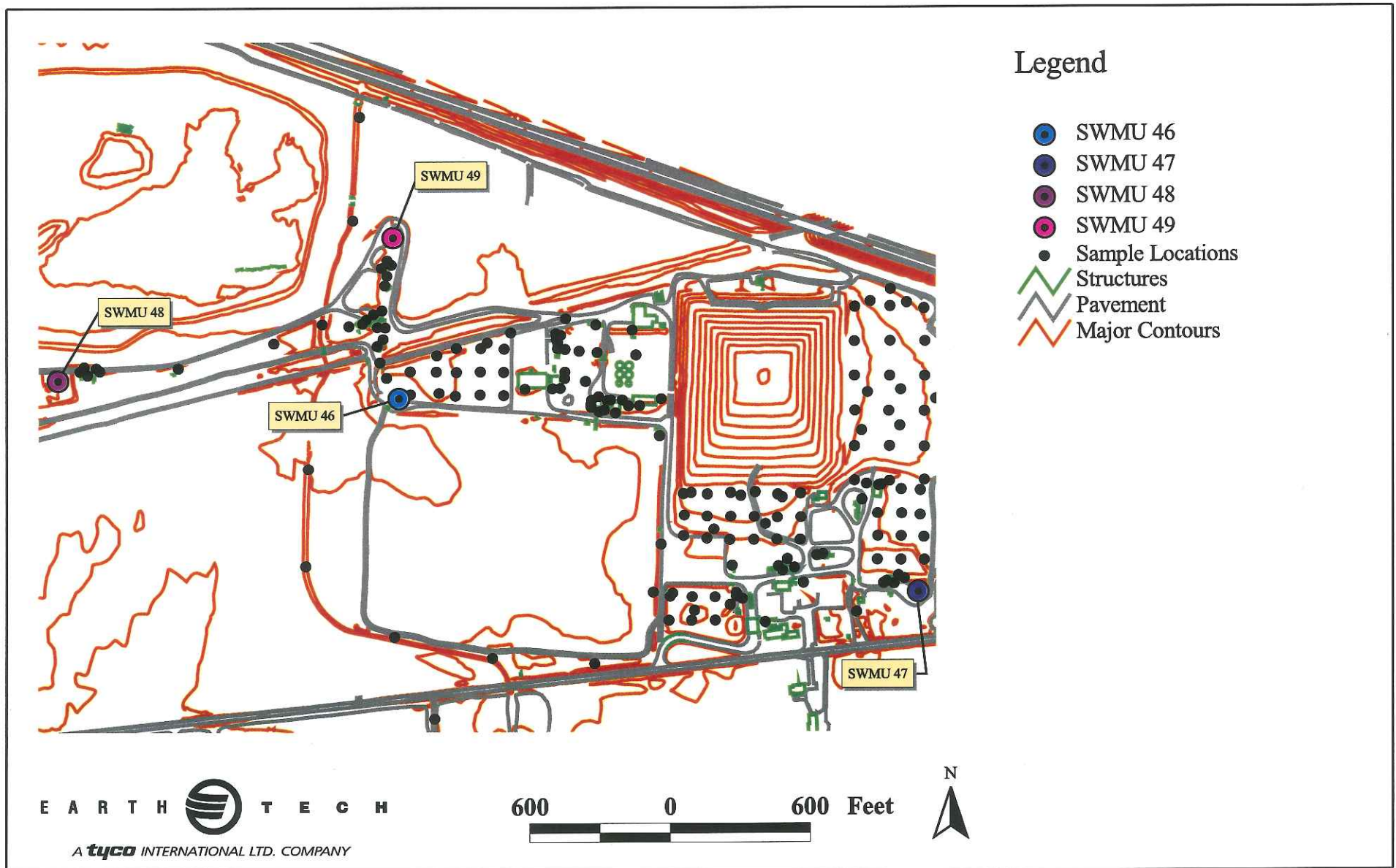


Figure 5-3.8b
Solid Waste Management Unit 46 Analytical Results Map
Waste Management of Ohio - Vickery

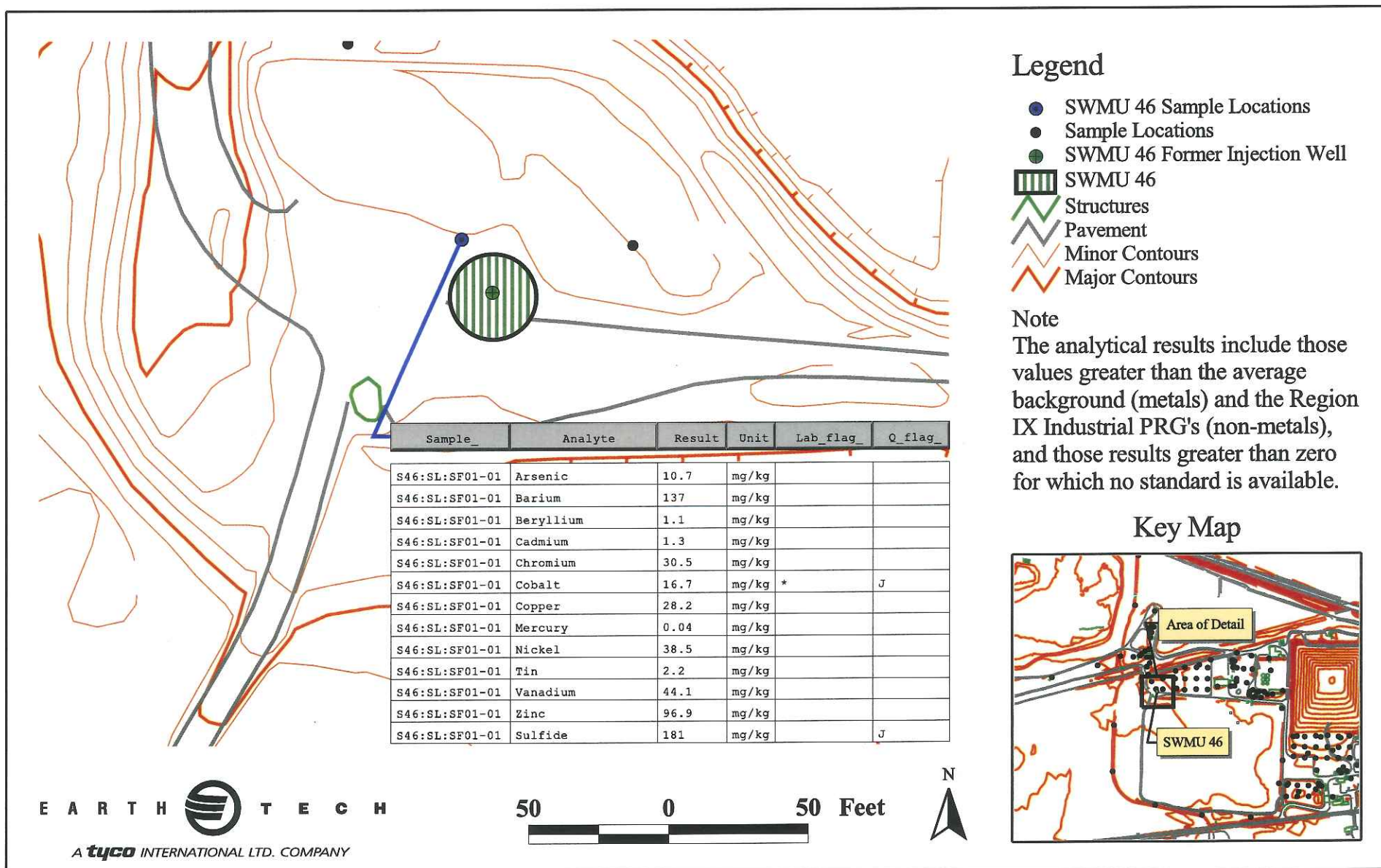


Figure 5-3.8c
Solid Waste Management Unit 47 Analytical Results Map
Waste Management of Ohio - Vickery

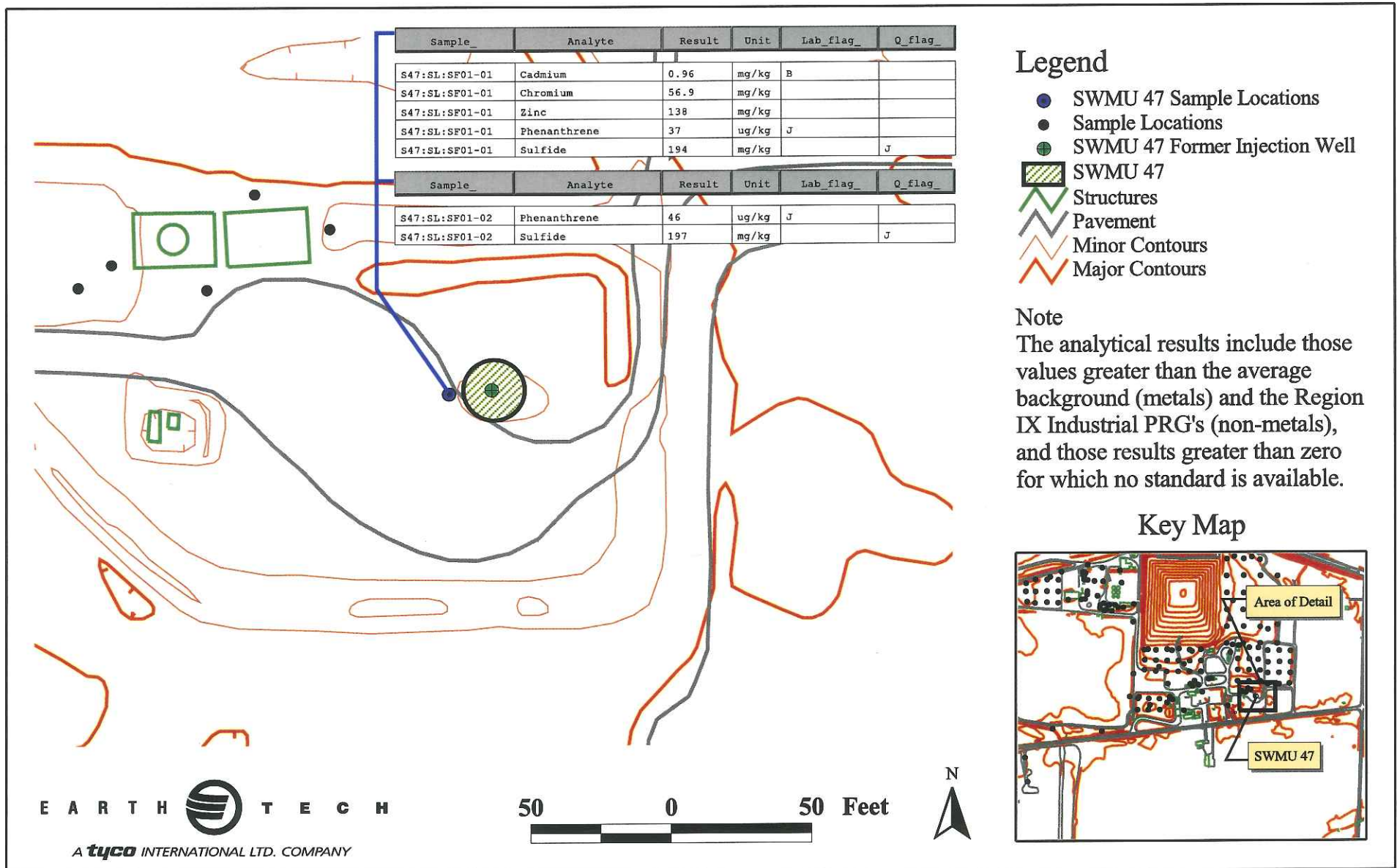


Figure 5-3.8d
Solid Waste Management Unit 48 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S48:SL:SF01-01	Cobalt	10.9	mg/kg		
S48:SL:SF01-01	Tin	1.5	mg/kg	B	
S48:SL:SF01-01	Sulfide	235	mg/kg		

Legend

- SWMU 48 Sample Locations
- Sample Locations
- SWMU 48 Former Injection Well
- ▬ SWMU 48
- ▬ Structures
- ▬ Pavement
- ▬ Minor Contours
- ▬ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

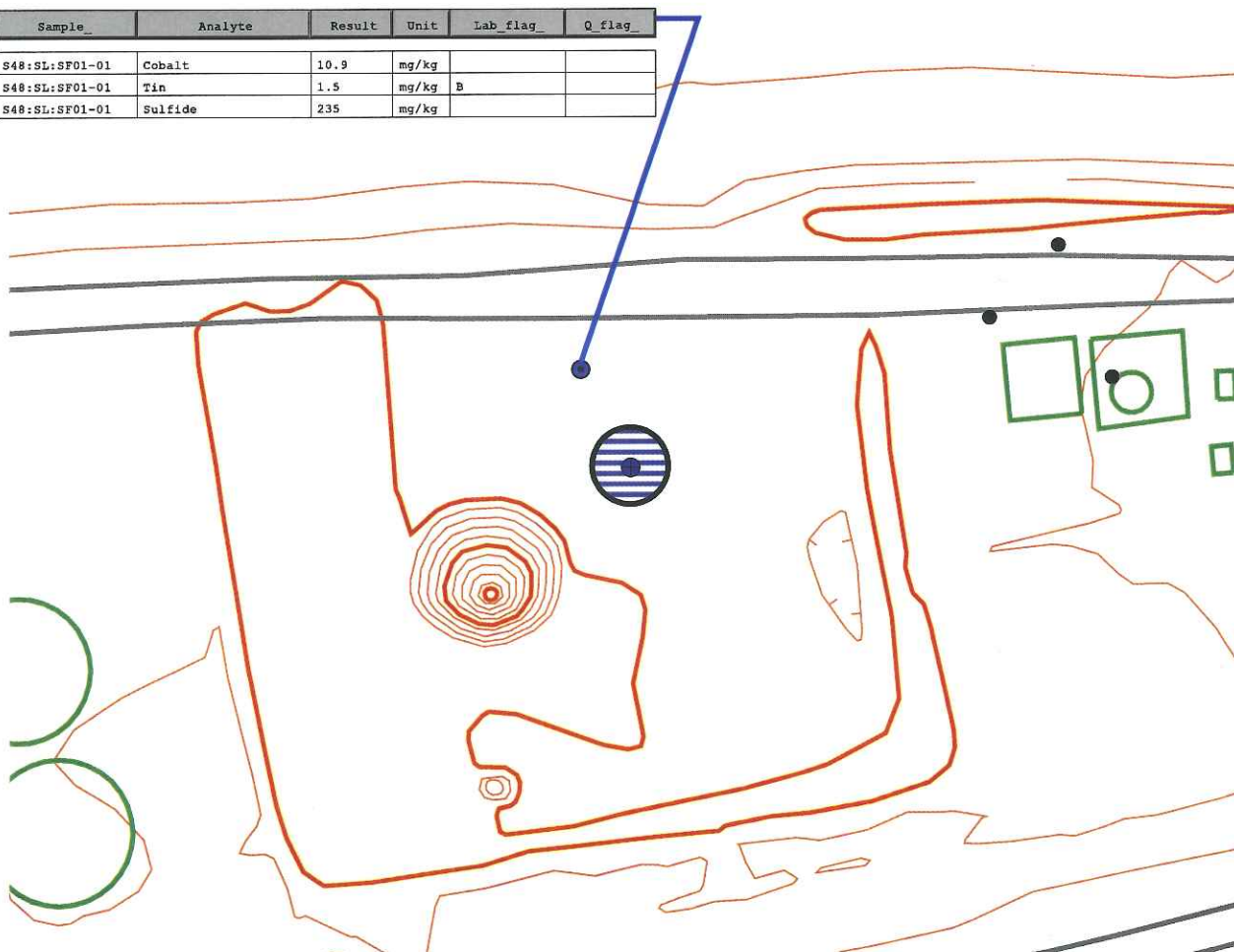
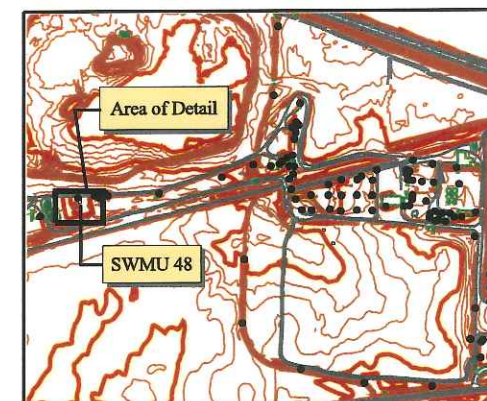


Figure 5-3.8e
Solid Waste Management Unit 49 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S49:SL:SF01-01	Tin	1.3	mg/kg	B	
S49:SL:SF01-01	Phenanthrene	71	ug/kg	J	
S49:SL:SF01-01	Sulfide	1600	mg/kg		

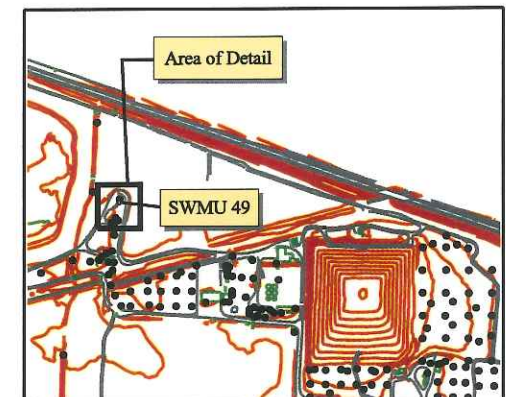
Legend

- SWMU 49 Sample Locations
- Sample Locations
- SWMU 49 Former Injection Well
- ▨ SWMU 49
- ✓ Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



EARTH  TECH

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50 0 50 Feet



Figure 5-3.9a
Solid Waste Management Unit Group I (15, 20, 41, 42, 43, 44 & 45) Location Map
Waste Management of Ohio - Vickery

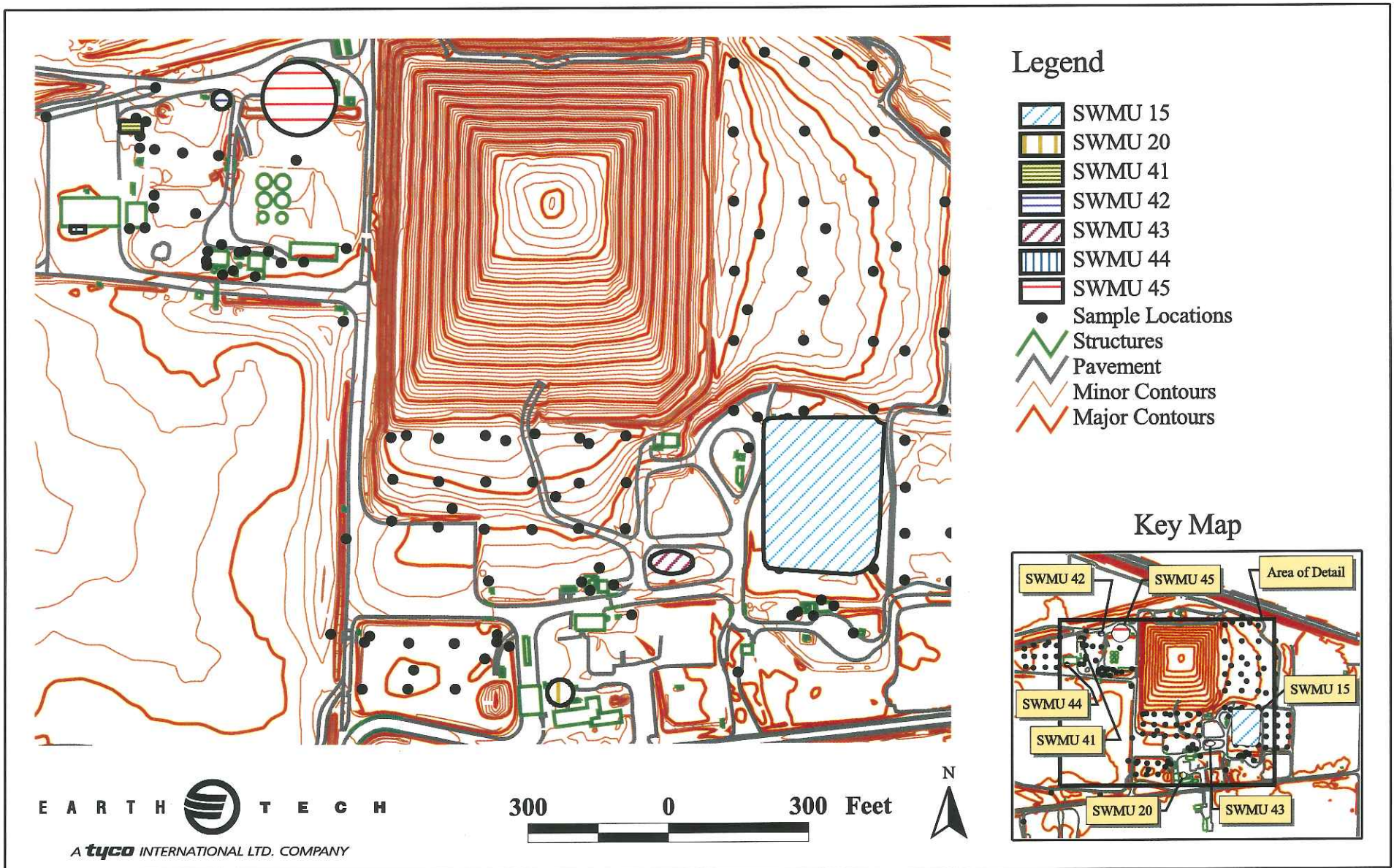


Figure 5-3.9b
Solid Waste Management Unit 15 Analytical Results Map
Waste Management of Ohio - Vickery

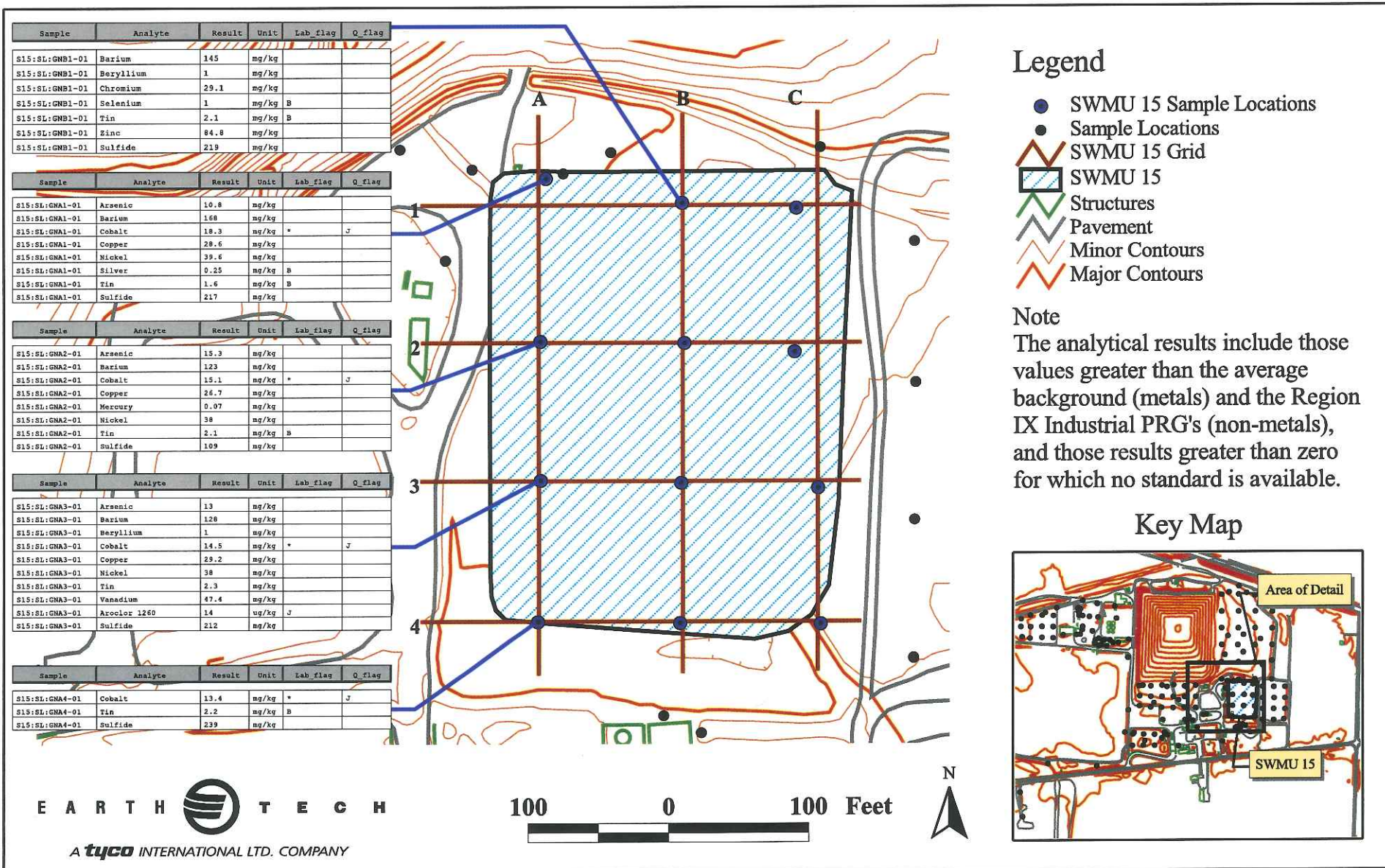


Figure 5-3.9c
Solid Waste Management Unit 15 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab flag	Q flag
S15:SL:GNB2-01	Antimony	1.1	mg/kg	N	J
S15:SL:GNB2-01	Arsenic	12	mg/kg		
S15:SL:GNB2-01	Barium	918	mg/kg		J
S15:SL:GNB2-01	Cadmium	2.4	mg/kg		J
S15:SL:GNB2-01	Chromium	98.8	mg/kg		J
S15:SL:GNB2-01	Cobalt	13.4	mg/kg	*	J
S15:SL:GNB2-01	Copper	177	mg/kg		J
S15:SL:GNB2-01	Lead	288	mg/kg	N	J
S15:SL:GNB2-01	Nickel	38.6	mg/kg		J
S15:SL:GNB2-01	Selenium	1.5	mg/kg		J
S15:SL:GNB2-01	Silver	0.61	mg/kg	B	
S15:SL:GNB2-01	Tin	7.4	mg/kg		J
S15:SL:GNB2-01	Vanadium	42.6	mg/kg		
S15:SL:GNB2-01	Zinc	2410	mg/kg		J
S15:SL:GNB2-01	Sulfide	225	mg/kg		

Sample	Analyte	Result	Unit	Lab flag	Q flag
S15:SL:GNB3-01	Arsenic	17	mg/kg		
S15:SL:GNB3-01	Barium	163	mg/kg		
S15:SL:GNB3-01	Beryllium	1.3	mg/kg		
S15:SL:GNB3-01	Chromium	36.1	mg/kg		
S15:SL:GNB3-01	Cobalt	20.8	mg/kg	*	J
S15:SL:GNB3-01	Copper	42.9	mg/kg		
S15:SL:GNB3-01	Nickel	47.7	mg/kg		
S15:SL:GNB3-01	Tin	1.6	mg/kg	B	
S15:SL:GNB3-01	Vanadium	58.4	mg/kg		
S15:SL:GNB3-01	Zinc	84.3	mg/kg		
S15:SL:GNB3-01	Sulfide	216	mg/kg		

Sample	Analyte	Result	Unit	Lab flag	Q flag
S15:SL:GNB4-01	Arsenic	16	mg/kg		
S15:SL:GNB4-01	Barium	148	mg/kg		
S15:SL:GNB4-01	Beryllium	1.1	mg/kg		
S15:SL:GNB4-01	Chromium	29.8	mg/kg		
S15:SL:GNB4-01	Cobalt	18.6	mg/kg	*	J
S15:SL:GNB4-01	Copper	31.2	mg/kg		
S15:SL:GNB4-01	Nickel	40.2	mg/kg		
S15:SL:GNB4-01	Silver	9.2	mg/kg	B	
S15:SL:GNB4-01	Tin	2	mg/kg	B	
S15:SL:GNB4-01	Vanadium	55.7	mg/kg		
S15:SL:GNB4-01	Sulfide	216	mg/kg		

Legend

- SWMU 15 Sample Locations
- Sample Locations
- SWMU 15 Grid
- SWMU 15
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

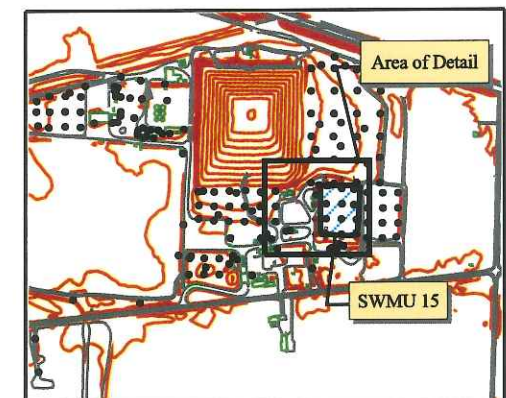


Figure 5-3.9d
Solid Waste Management Unit 15 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S15:SL:GNC1-01	Arsenic	13.8	mg/kg		
S15:SL:GNC1-01	Barium	128	mg/kg		
S15:SL:GNC1-01	Cobalt	10.6	mg/kg	*	J
S15:SL:GNC1-01	Nickel	30.5	mg/kg		
S15:SL:GNC1-01	Tin	1.7	mg/kg	B	
S15:SL:GNC1-01	Sine	117	mg/kg		
S15:SL:GNC1-01	Sulfide	361	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S15:SL:GNC2-01	Cobalt	10.6	mg/kg	*	J
S15:SL:GNC2-01	Tin	2.3	mg/kg		J
S15:SL:GNC2-01	Sulfide	226	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S15:SL:GNC3-01	Arsenic	13.5	mg/kg		
S15:SL:GNC3-01	Barium	114	mg/kg		
S15:SL:GNC3-01	Beryllium	1.1	mg/kg		
S15:SL:GNC3-01	Cobalt	14.8	mg/kg	*	J
S15:SL:GNC3-01	Selenium	1.6	mg/kg		
S15:SL:GNC3-01	Tin	1.7	mg/kg	B	
S15:SL:GNC3-01	Vanadium	48.7	mg/kg		
S15:SL:GNC3-01	Zinc	80.4	mg/kg		
S15:SL:GNC3-01	Sulfide	215	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S15:SL:GNC4-01	Arsenic	14.7	mg/kg		
S15:SL:GNC4-01	Beryllium	1.1	mg/kg		
S15:SL:GNC4-01	Chromium	30.8	mg/kg		
S15:SL:GNC4-01	Cobalt	17.6	mg/kg	*	J
S15:SL:GNC4-01	Copper	32.9	mg/kg		
S15:SL:GNC4-01	Nickel	40.5	mg/kg		
S15:SL:GNC4-01	Selenium	1.3	mg/kg		
S15:SL:GNC4-01	Tin	1.8	mg/kg	B	
S15:SL:GNC4-01	Vanadium	52.3	mg/kg		
S15:SL:GNC4-01	Zinc	83	mg/kg		
S15:SL:GNC4-01	Sulfide	231	mg/kg		

Legend

- SWMU 15 Sample Locations
- Sample Locations
- SWMU 15 Grid
- SWMU 15
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

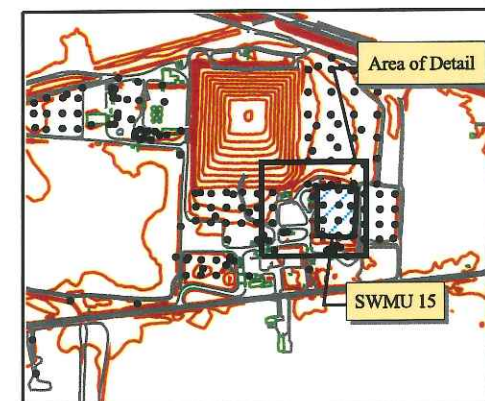


Figure 5-3.9e
Solid Waste Management Unit 20 Analytical Results Map
Waste Management of Ohio - Vickery

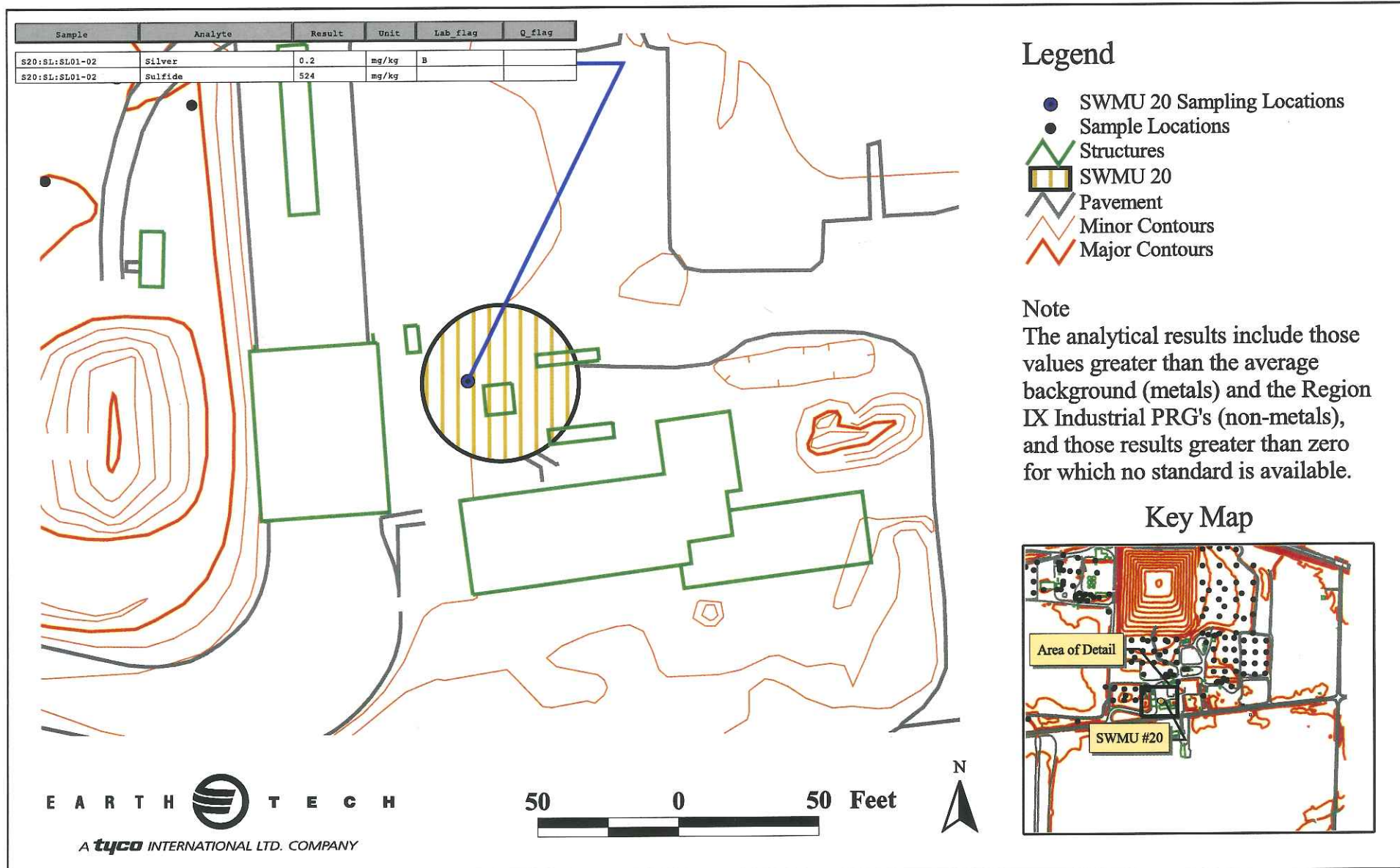


Figure 5-3.9f
Solid Waste Management Unit 41 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S41:SL:SF01-01	Arsenic	10.7	mg/kg	*N	J
S41:SL:SF01-01	Cobalt	11.8	mg/kg	*	J
S41:SL:SF01-01	Mercury	0.05	mg/kg		
S41:SL:SF01-01	Nickel	35.3	mg/kg	*	J
S41:SL:SF01-01	Tin	2.2	mg/kg	B	
S41:SL:SF01-01	Benzo[g,h,i]perylene	190	ug/kg	J	
S41:SL:SF01-01	Phenanthrene	100	ug/kg	J	
S41:SL:SF01-01	Sulfide	149	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S41:SL:SF03-01	Silver	0.3	mg/kg	B	
S41:SL:SF03-01	Tin	2.5	mg/kg		
S41:SL:SF03-01	Sulfide	119	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S41:SL:SF02-01	Arsenic	10.3	mg/kg	*N	J
S41:SL:SF02-01	Barium	104	mg/kg	*	J
S41:SL:SF02-01	Cadmium	0.99	mg/kg	B	
S41:SL:SF02-01	Cobalt	12.6	mg/kg	*	J
S41:SL:SF02-01	Copper	27.3	mg/kg	*N	J
S41:SL:SF02-01	Mercury	0.06	mg/kg		
S41:SL:SF02-01	Nickel	32.7	mg/kg	*	J
S41:SL:SF02-01	Silver	0.24	mg/kg	B	
S41:SL:SF02-01	Tin	2.3	mg/kg		
S41:SL:SF02-01	Benzo[a]pyrene	1300	ug/kg		
S41:SL:SF02-01	Benzo[g,h,i]perylene	770	ug/kg		
S41:SL:SF02-01	Phenanthrene	360	ug/kg	J	
S41:SL:SF02-01	Sulfide	140	mg/kg		

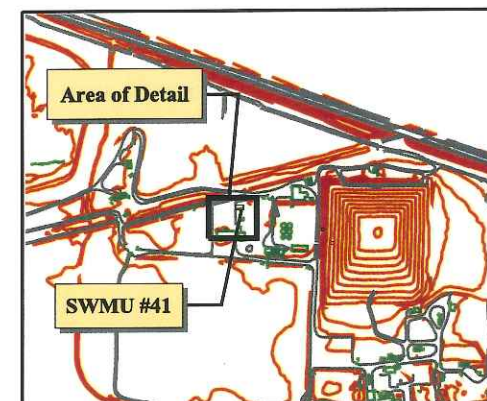
Legend

- SWMU 41 Sample Locations
- Sample Locations
- ▬ Structures
- ▬ SWMU 41
- ▬ Pavement
- ▬ Minor Contours
- ▬ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



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50 0 50 Feet



Figure 5-3.9g
Solid Waste Management Unit 42 Analytical Results Map
Waste Management of Ohio - Vickery

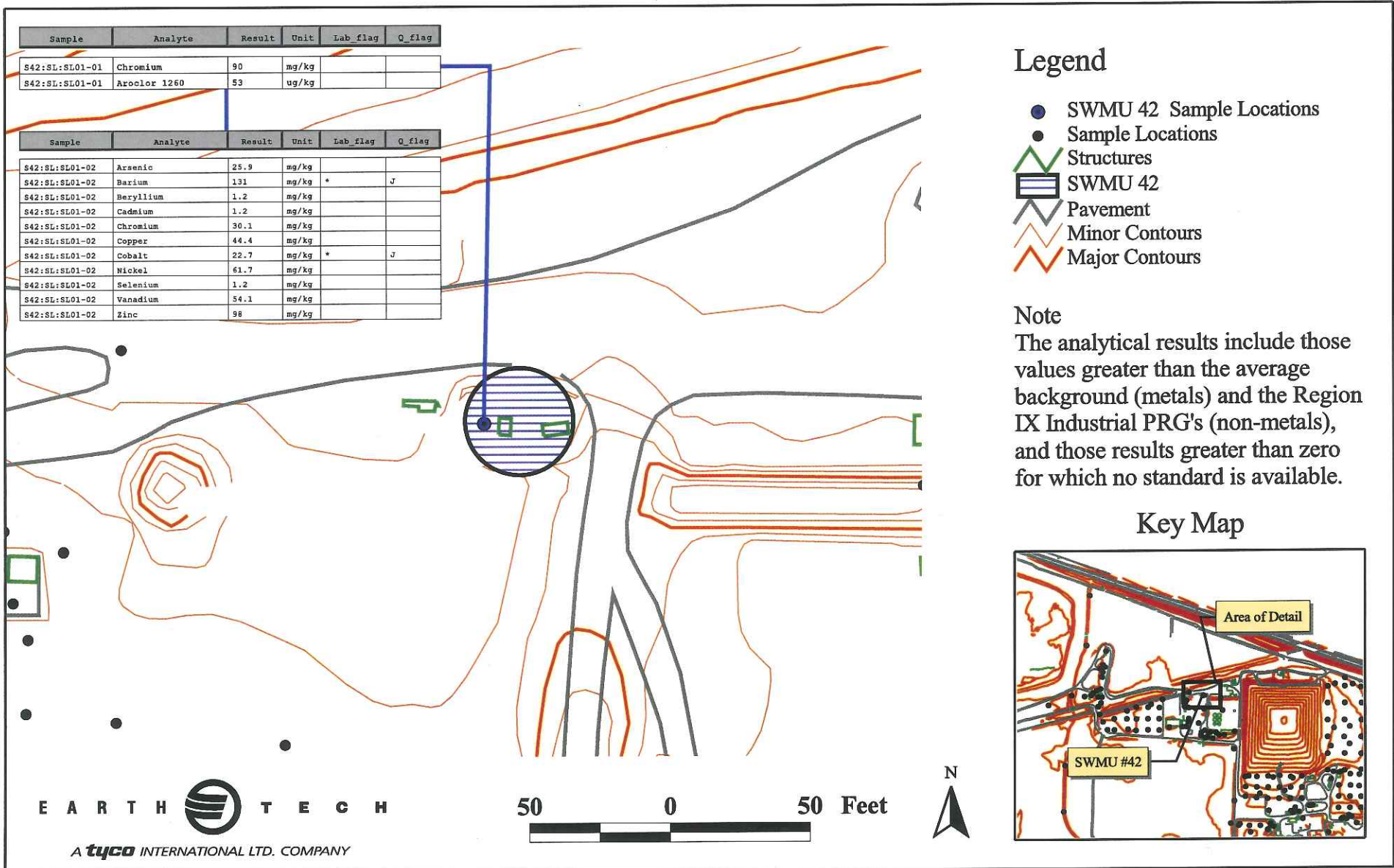


Figure 5-3.9h

Solid Waste Management Unit 43 Analytical Results Map

Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S43:SL:SL01-04	Barium	111	mg/kg		
S43:SL:SL01-04	Beryllium	1.2	mg/kg		
S43:SL:SL01-04	Chromium	32.8	mg/kg		
S43:SL:SL01-04	Cobalt	11.1	mg/kg		
S43:SL:SL01-04	Copper	28.4	mg/kg		
S43:SL:SL01-04	Nickel	34.9	mg/kg		
S43:SL:SL01-04	Selenium	1.2	mg/kg	BN	J
S43:SL:SL01-04	Tin	1.4	mg/kg	B	
S43:SL:SL01-04	Vanadium	45.9	mg/kg		
S43:SL:SL01-04	Zinc	86.9	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S43:SL:SL01-05	Arsenic	14.3	mg/kg		
S43:SL:SL01-05	Beryllium	1.1	mg/kg		
S43:SL:SL01-05	Cadmium	0.98	mg/kg	B	
S43:SL:SL01-05	Chromium	29.6	mg/kg		
S43:SL:SL01-05	Copper	30.8	mg/kg		
S43:SL:SL01-05	Nickel	29.9	mg/kg		
S43:SL:SL01-05	Selenium	1.7	mg/kg	N	J
S43:SL:SL01-05	Zinc	85.4	mg/kg		
S43:SL:SL01-05	Vanadium	48.6	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S43:SL:SL02-04	Arsenic	18.8	mg/kg		
S43:SL:SL02-04	Barium	143	mg/kg		
S43:SL:SL02-04	Beryllium	1.2	mg/kg		
S43:SL:SL02-04	Cadmium	1.6	mg/kg		
S43:SL:SL02-04	Chromium	33.2	mg/kg		
S43:SL:SL02-04	Cobalt	26	mg/kg		
S43:SL:SL02-04	Copper	42.3	mg/kg		
S43:SL:SL02-04	Nickel	78.3	mg/kg		
S43:SL:SL02-04	Silver	0.38	mg/kg	B	
S43:SL:SL02-04	Selenium	1.4	mg/kg	N	J
S43:SL:SL02-04	Tin	1.2	mg/kg	B	
S43:SL:SL02-04	Vanadium	53.4	mg/kg		
S43:SL:SL02-04	Zinc	95.9	mg/kg		

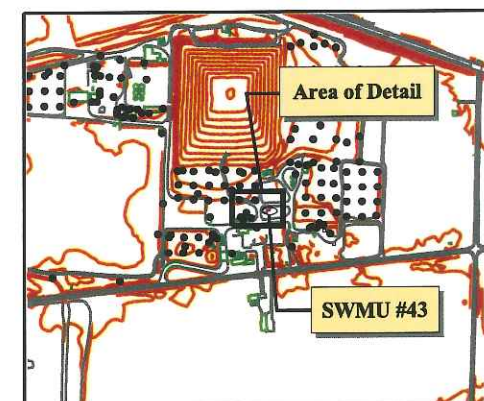
Legend

- SWMU 43 Sampling Locations
- Sample Locations
- ▢ Structures
- ▨ SWMU 43
- ▬ Pavement
- ~ Minor Contours
- ~ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



A tyco INTERNATIONAL LTD. COMPANY

50 0 50 Feet



Figure 5-3.9i
Solid Waste Management Unit 44 Analytical Results Map
Waste Management of Ohio - Vickery

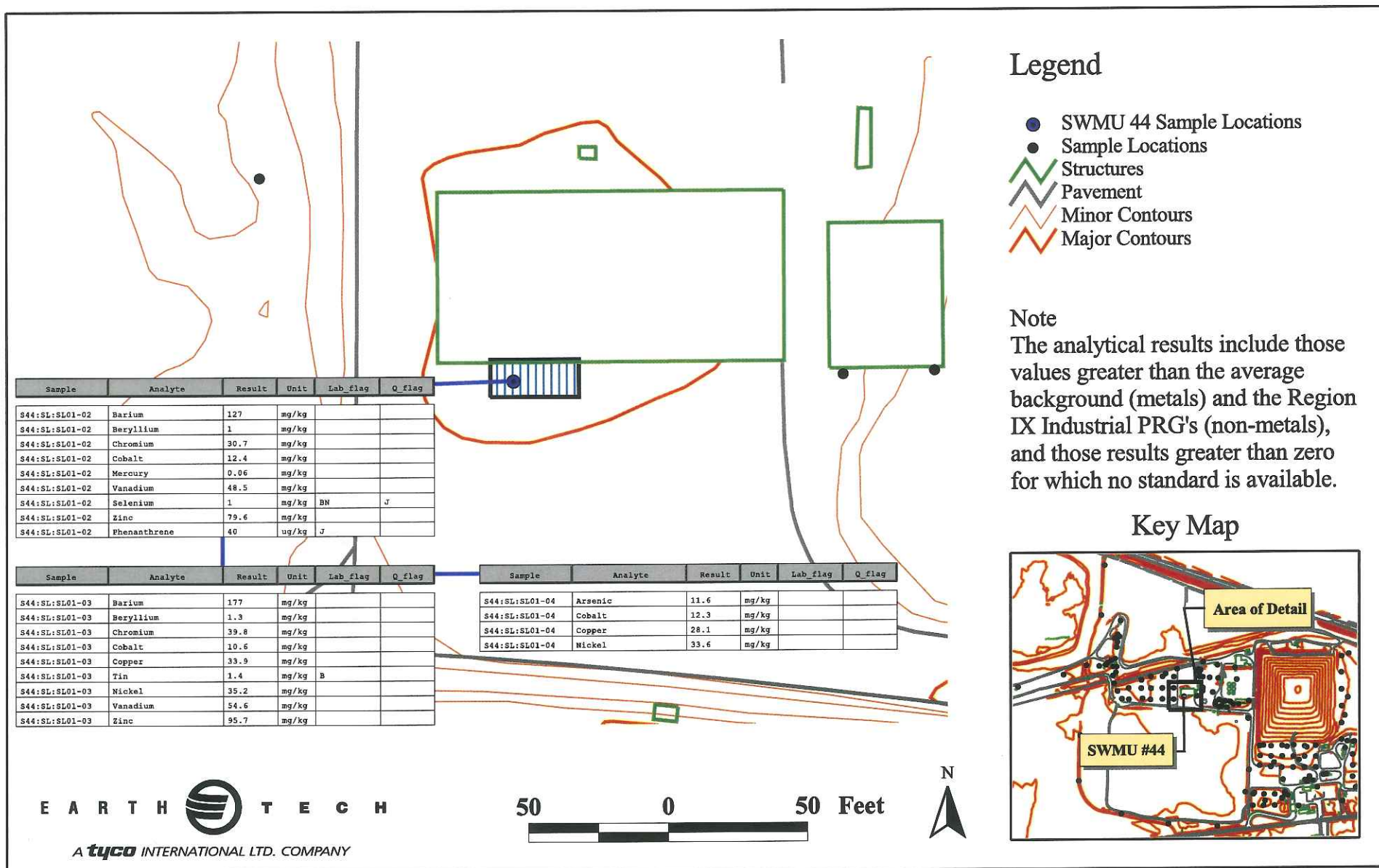


Figure 5-3.9j
Solid Waste Management Unit 45 Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
S45:SL:SL01-04	Arsenic	26.2	mg/kg		
S45:SL:SL01-04	Barium	109	mg/kg	*	J
S45:SL:SL01-04	Beryllium	1.1	mg/kg		
S45:SL:SL01-04	Cadmium	1	mg/kg		
S45:SL:SL01-04	Chromium	28.5	mg/kg		
S45:SL:SL01-04	Cobalt	24.5	mg/kg	*	J
S45:SL:SL01-04	Copper	41.8	mg/kg		
S45:SL:SL01-04	Nickel	46.8	mg/kg		
S45:SL:SL01-04	Vanadium	48.7	mg/kg		
S45:SL:SL01-04	Zinc	87.7	mg/kg		

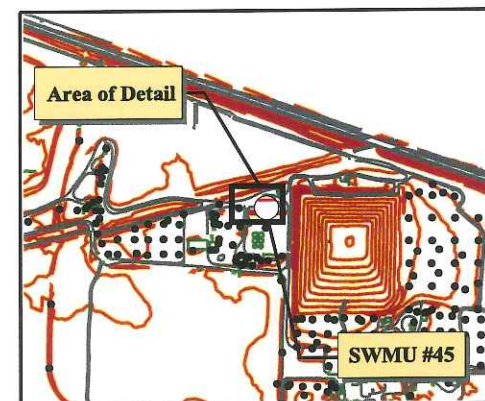
Legend

- SWMU 45 Sample Locations
- Sample Locations
- ▬ Structures
- ▬ SWMU 45
- ▬ Pavement
- ▬ Minor Contours
- ▬ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map



A **tyco** INTERNATIONAL LTD. COMPANY

50 0 50 Feet



Figure 5-4.1a
Area of Concern A Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACA:SL:SF02-01	Barium	188	mg/kg		
ACA:SL:SF02-01	Beryllium	1.6	mg/kg		
ACA:SL:SF02-01	Cadmium	1.4	mg/kg		
ACA:SL:SF02-01	Chromium	31.2	mg/kg		
ACA:SL:SF02-01	Cobalt	19.3	mg/kg	*	J
ACA:SL:SF02-01	Copper	29.3	mg/kg		
ACA:SL:SF02-01	Nickel	57	mg/kg		J
ACA:SL:SF02-01	Tin	3	mg/kg		
ACA:SL:SF02-01	Zinc	97.6	mg/kg		
ACA:SL:SF02-01	Sulfide	450	mg/kg		J

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACA:SL:SF03-01	Barium	178	mg/kg		
ACA:SL:SF03-01	Beryllium	1.4	mg/kg		
ACA:SL:SF03-01	Chromium	38	mg/kg		
ACA:SL:SF03-01	Cobalt	10.9	mg/kg		
ACA:SL:SF03-01	Copper	30.3	mg/kg		
ACA:SL:SF03-01	Mercury	0.04	mg/kg		
ACA:SL:SF03-01	Nickel	37.3	mg/kg		
ACA:SL:SF03-01	Tin	2.7	mg/kg		
ACA:SL:SF03-01	Vanadium	55.2	mg/kg		
ACA:SL:SF03-01	Zinc	89.4	mg/kg		
ACA:SL:SF03-01	Sulfide	169	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACA:SL:SF04-01	Barium	116	mg/kg		
ACA:SL:SF04-01	Beryllium	1.2	mg/kg		
ACA:SL:SF04-01	Cobalt	12.2	mg/kg		
ACA:SL:SF04-01	Mercury	0.07	mg/kg		
ACA:SL:SF04-01	Selenium	1.3	mg/kg	N	J
ACA:SL:SF04-01	Tin	2.5	mg/kg		
ACA:SL:SF04-01	Zinc	90.9	mg/kg		
ACA:SL:SF04-01	Sulfide	186	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACA:SL:SF01-01	Barium	153	mg/kg		
ACA:SL:SF01-01	Beryllium	1.1	mg/kg		
ACA:SL:SF01-01	Chromium	29.8	mg/kg		
ACA:SL:SF01-01	Cobalt	12.1	mg/kg		
ACA:SL:SF01-01	Copper	28.6	mg/kg		
ACA:SL:SF01-01	Nickel	36.4	mg/kg		
ACA:SL:SF01-01	Tin	2.1	mg/kg	B	
ACA:SL:SF01-01	Vanadium	44.9	mg/kg		
ACA:SL:SF01-01	Sulfide	156	mg/kg		

Legend

- ACA Sample Locations
- Piping
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.



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800 0 800 Feet



Figure 5-4.1b
Area of Concern A Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab flag	Q flag
ACA:SL:SF05-01	Arsenic	12	mg/kg	N	J
ACA:SL:SF05-01	Beryllium	1.2	mg/kg		
ACA:SL:SF05-01	Cadmium	1.2	mg/kg		
ACA:SL:SF05-01	Cobalt	26.5	mg/kg		
ACA:SL:SF05-01	Nickel	37.6	mg/kg		
ACA:SL:SF05-01	Selenium	1.2	mg/kg	N	J
ACA:SL:SF05-01	Tin	2	mg/kg	B	
ACA:SL:SF05-01	Zinc	81.1	mg/kg		
ACA:SL:SF05-01	Sulfide	234	mg/kg		

Sample	Analyte	Result	Unit	Lab flag	Q flag
ACA:SL:SF06-01	Arsenic	11.3	mg/kg	N	J
ACA:SL:SF06-01	Barium	208	mg/kg		
ACA:SL:SF06-01	Beryllium	1.3	mg/kg		
ACA:SL:SF06-01	Cadmium	1	mg/kg		
ACA:SL:SF06-01	Chromium	33.5	mg/kg		
ACA:SL:SF06-01	Cobalt	16.5	mg/kg		
ACA:SL:SF06-01	Copper	31.2	mg/kg		
ACA:SL:SF06-01	Nickel	49.5	mg/kg		
ACA:SL:SF06-01	Silver	0.32	mg/kg	B	
ACA:SL:SF06-01	Tin	2.1	mg/kg		
ACA:SL:SF06-01	Vanadium	48.7	mg/kg		
ACA:SL:SF06-01	Zinc	81.8	mg/kg		
ACA:SL:SF06-01	Sulfide	1010	mg/kg		

Sample	Analyte	Result	Unit	Lab flag	Q flag
ACA:SL:SF07-01	Arsenic	9.8	mg/kg	N	J
ACA:SL:SF07-01	Barium	125	mg/kg		
ACA:SL:SF07-01	Tin	1.4	mg/kg	B	
ACA:SL:SF07-01	Sulfide	209	mg/kg		

Legend

- ACA Sample Locations
- Piping
- Structures
- Pavement
- Minor Contours
- Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Sample	Analyte	Result	Unit	Lab flag	Q flag
ACA:SL:SF08-01	Arsenic	15.5	mg/kg		
ACA:SL:SF08-01	Tin	2.5	mg/kg		
ACA:SL:SF08-01	2-Methylnaphthalene	87	ug/kg	J	
ACA:SL:SF08-01	Phenanthrene	180	ug/kg	J	
ACA:SL:SF08-01	Sulfide	381	mg/kg		J



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800 0 800 Feet



Figure 5-4.1c
Area of Concern A Analytical Results Map
Waste Management of Ohio - Vickery

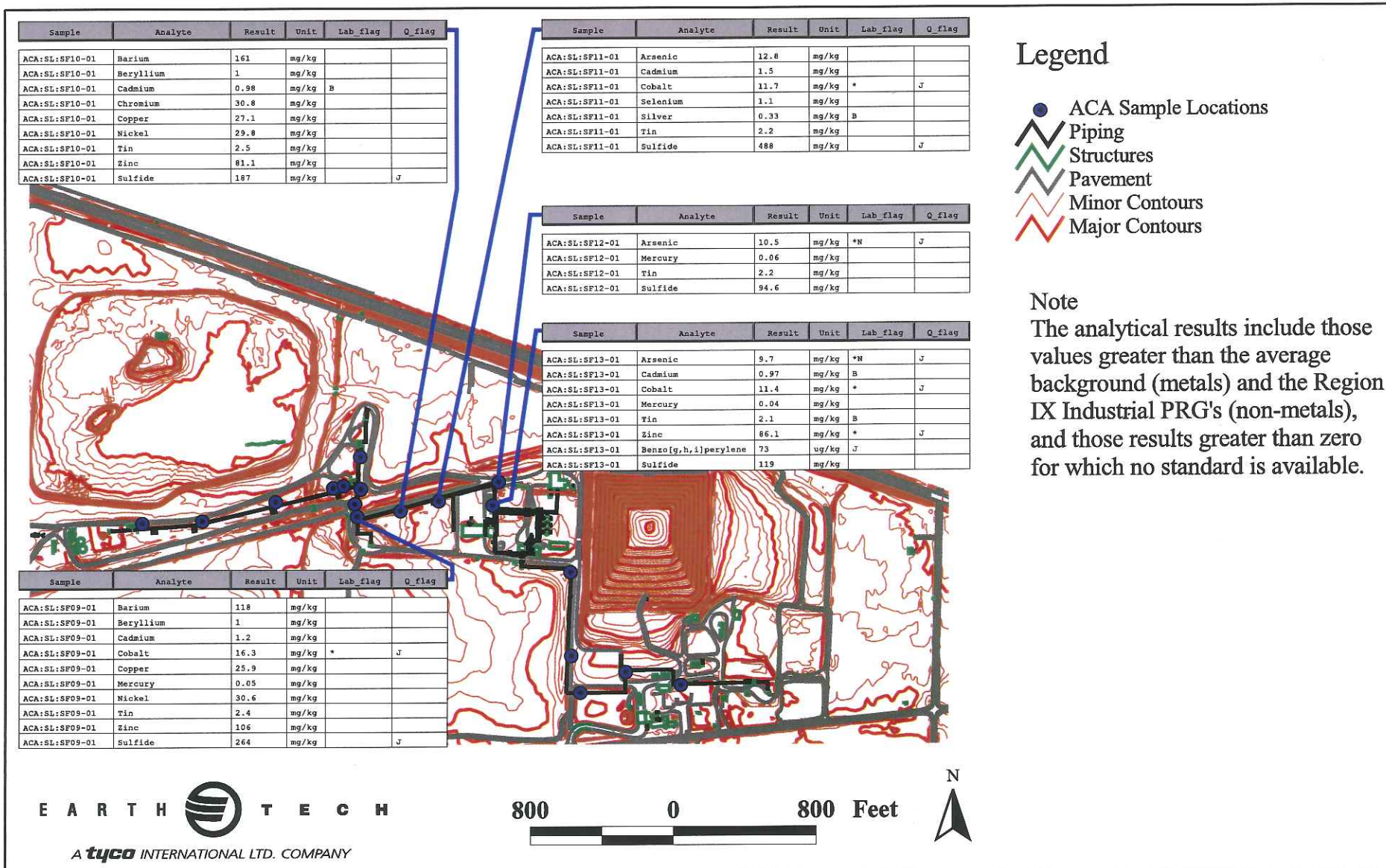


Figure 5-4.1d
Area of Concern A Analytical Results Map
Waste Management of Ohio - Vickery

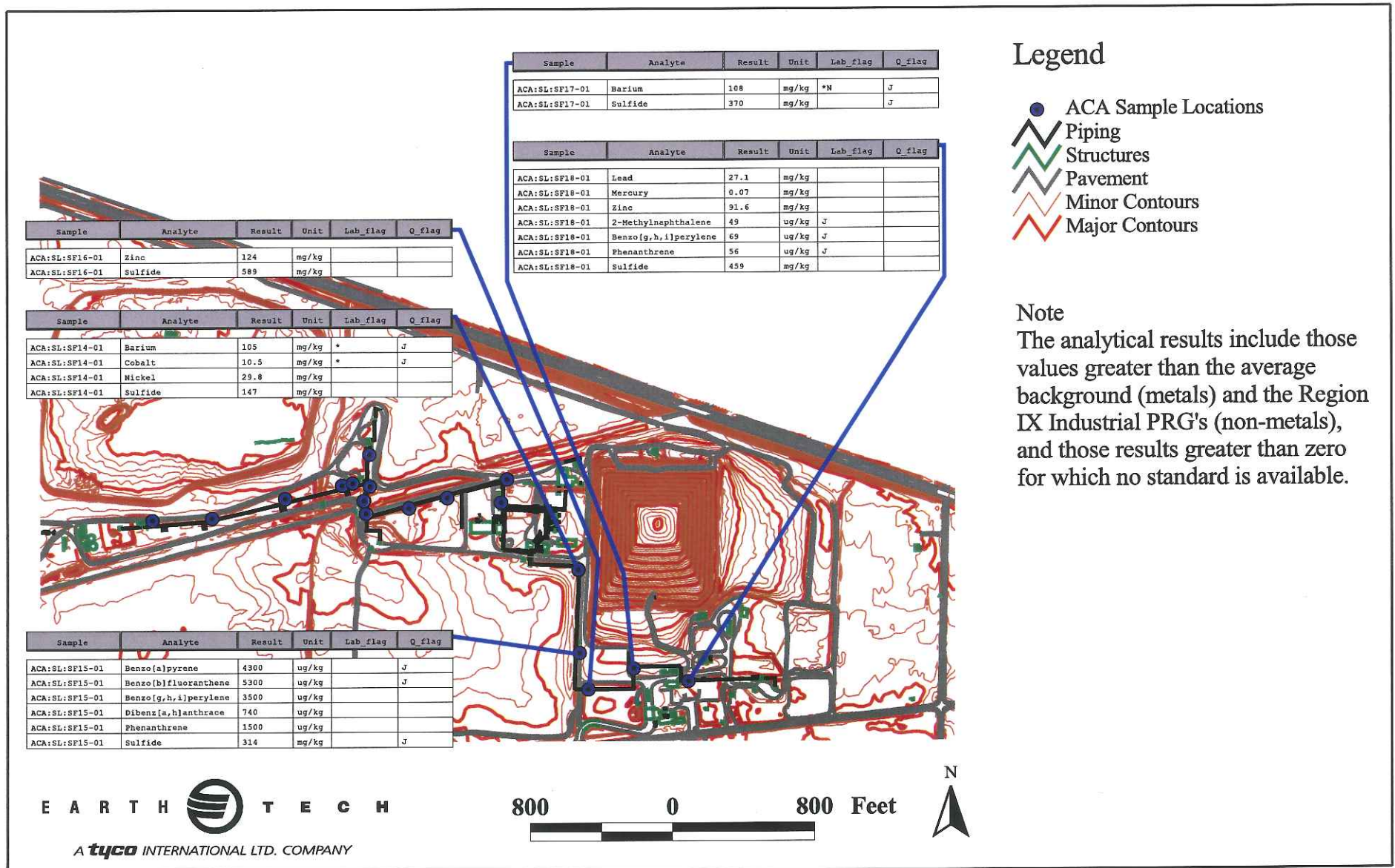


Figure 5-4.2
Area of Concern B Analytical Results Map
Waste Management of Ohio - Vickery

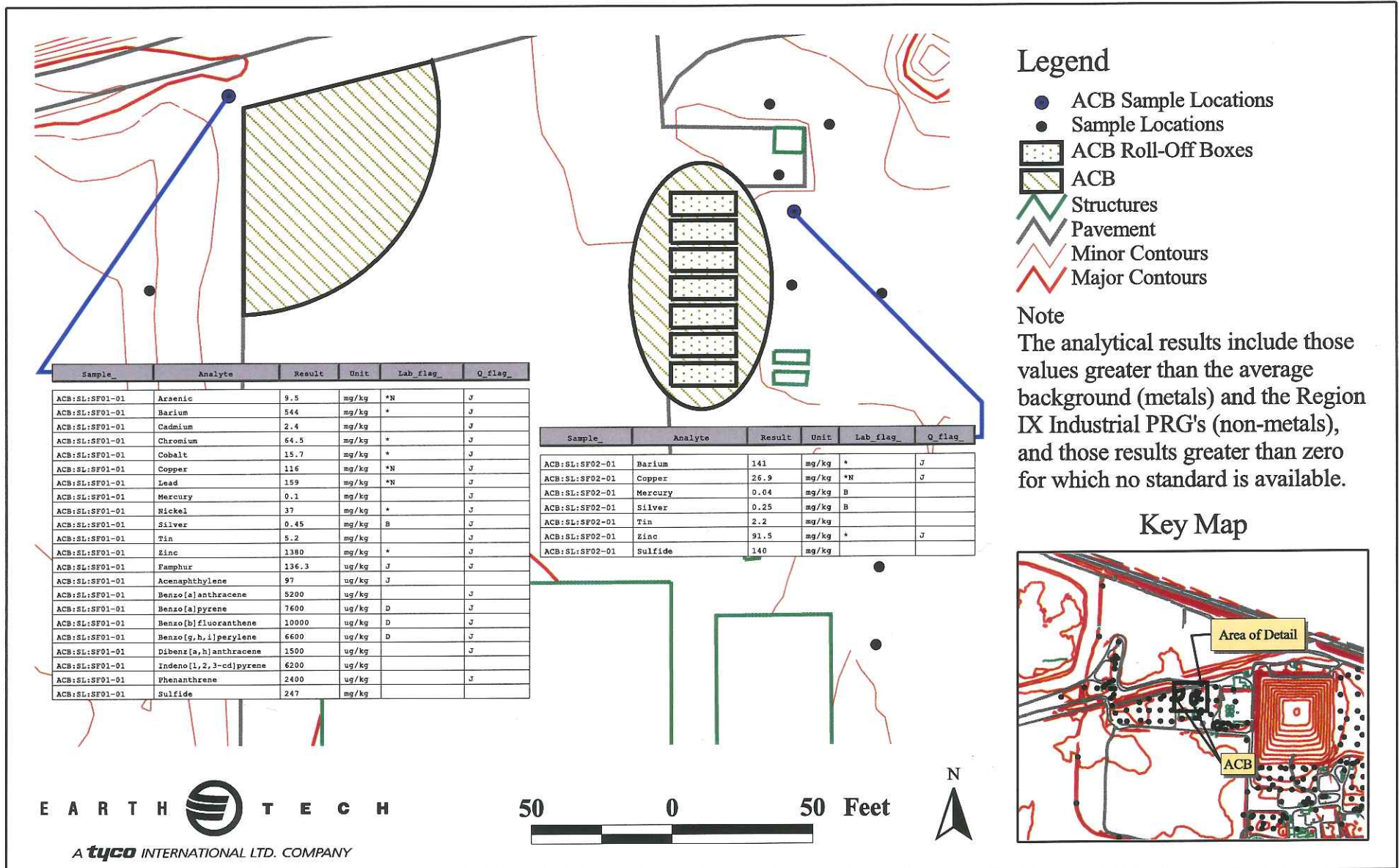


Figure 5-4.3
Area of Concern C Pug Mill Analytical Results Map
Waste Management of Ohio - Vickery

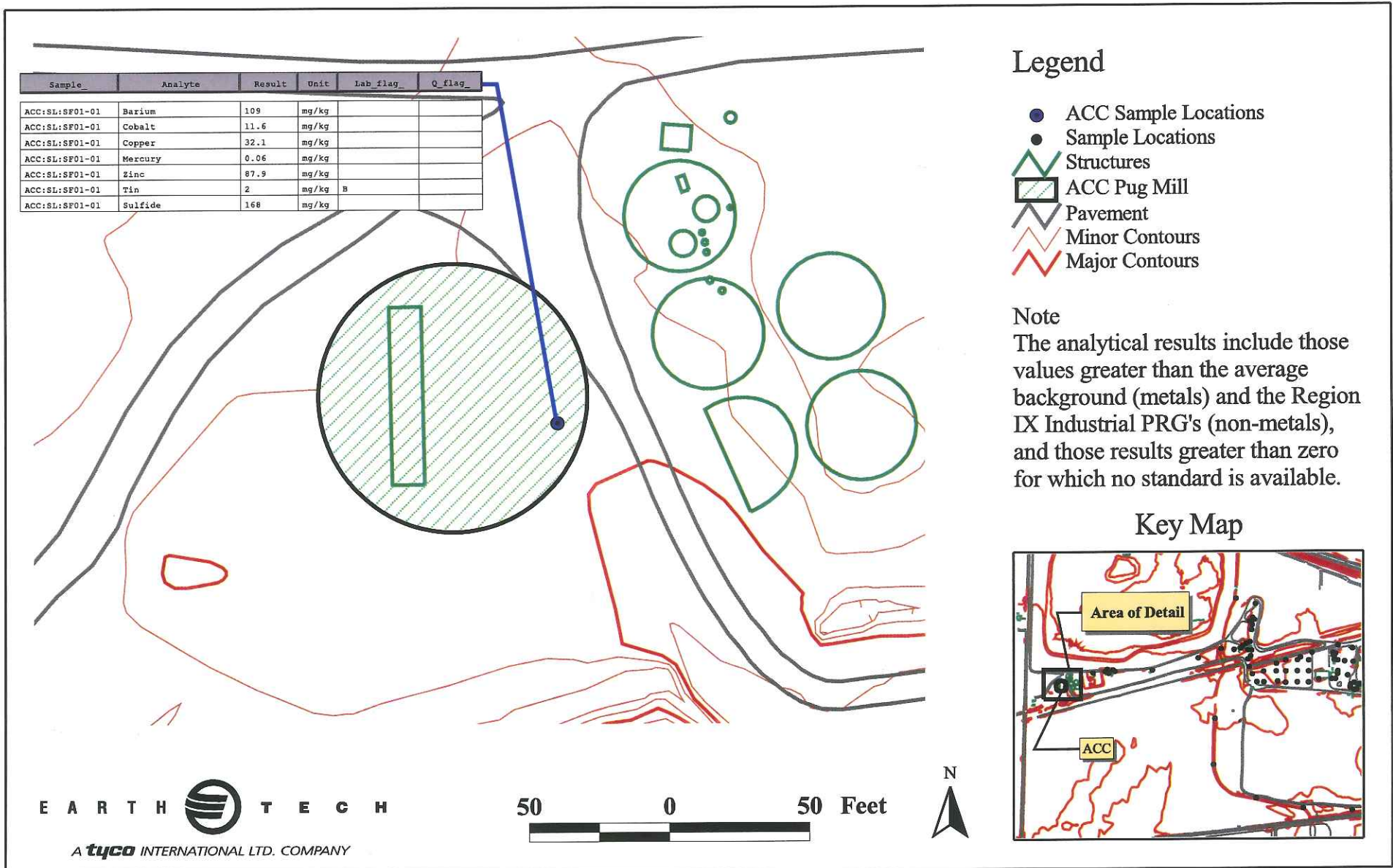


Figure 5-4.6a
Area of Concern F Location 1 Analytical Results Map
Waste Management of Ohio - Vickery

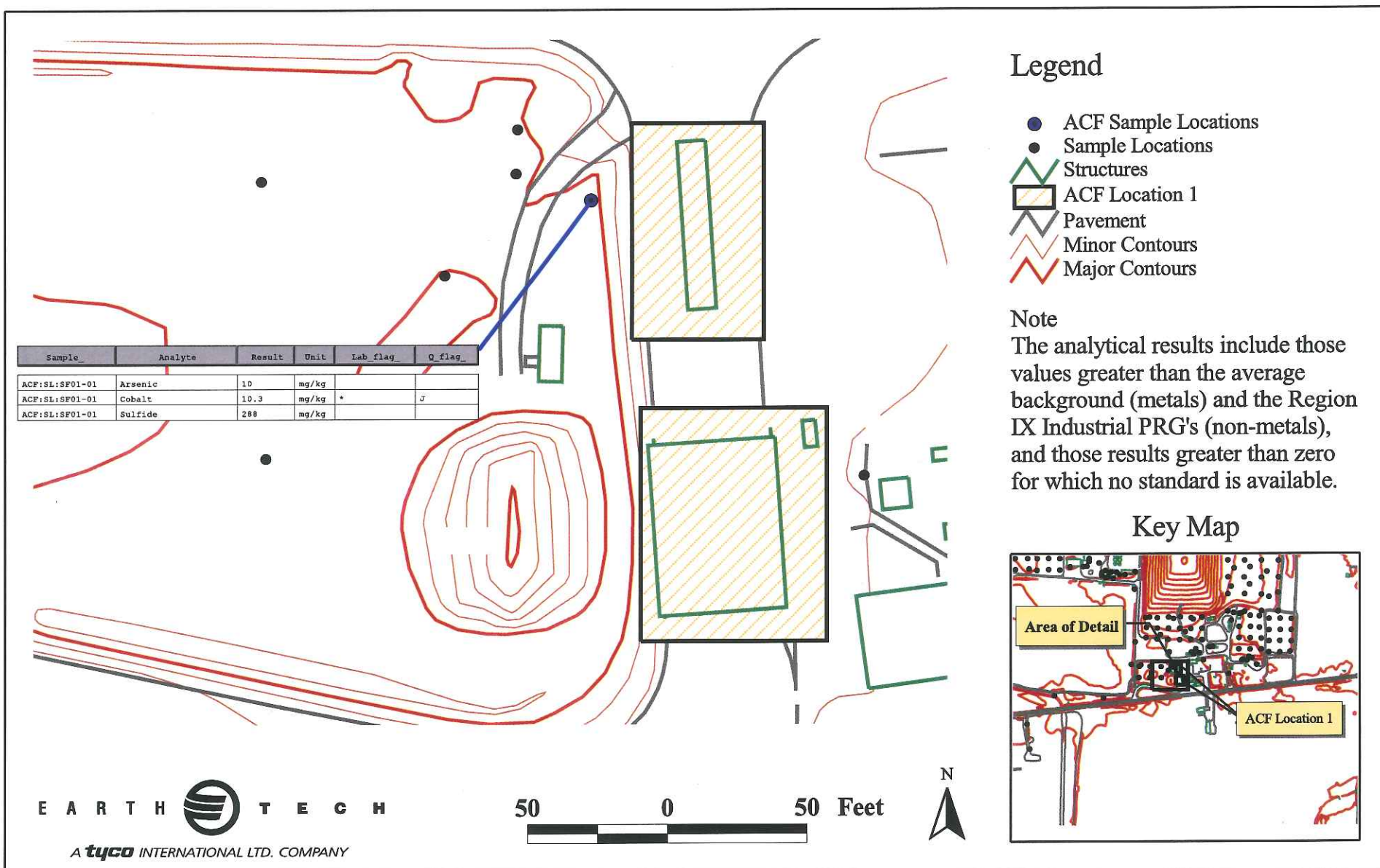


Figure 5-4.6b
Area of Concern F Location 2 Analytical Results Map
Waste Management of Ohio - Vickery

Sample_	Analyte	Result	Unit	Lab_flag_	Q_flag_
ACF:SL:SF02-01	Arsenic	10.4	mg/kg	*N	J
ACF:SL:SF02-01	Barium	196	mg/kg	*N	J
ACF:SL:SF02-01	Beryllium	1.1	mg/kg		
ACF:SL:SF02-01	Cadmium	1.9	mg/kg		
ACF:SL:SF02-01	Cobalt	28.6	mg/kg	*	J
ACF:SL:SF02-01	Mercury	0.04	mg/kg	B	
ACF:SL:SF02-01	Nickel	45.7	mg/kg	*	J
ACF:SL:SF02-01	Selenium	1	mg/kg	N	J
ACF:SL:SF02-01	Silver	0.34	mg/kg	B	
ACF:SL:SF02-01	Vanadium	43.1	mg/kg		
ACF:SL:SF02-01	Zinc	90.1	mg/kg		
ACF:SL:SF02-01	Benzo[g,h,i]perylene	170	ug/kg	J	
ACF:SL:SF02-01	Phenanthrene	110	ug/kg	J	
ACF:SL:SF02-01	Sulfide	296	mg/kg		J

Legend

- ACF Sample Locations
- Sample Locations
- ▬ Structures
- ▬ ACF Location 2
- ▬ Pavement
- ▬ Minor Contours
- ▬ Major Contours

Note

The analytical results include those values greater than the average background (metals) and the Region IX Industrial PRG's (non-metals), and those results greater than zero for which no standard is available.

Key Map

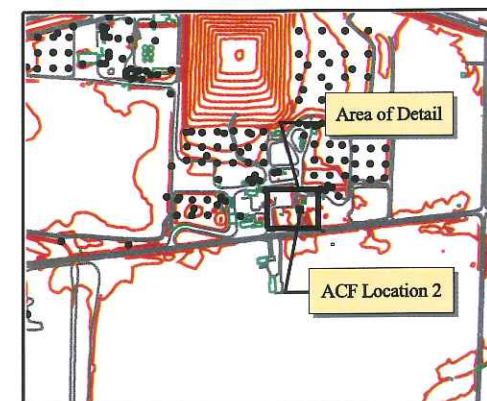


Figure 5-4.8a
Area of Concern H Analytical Results Map
Waste Management of Ohio - Vickery

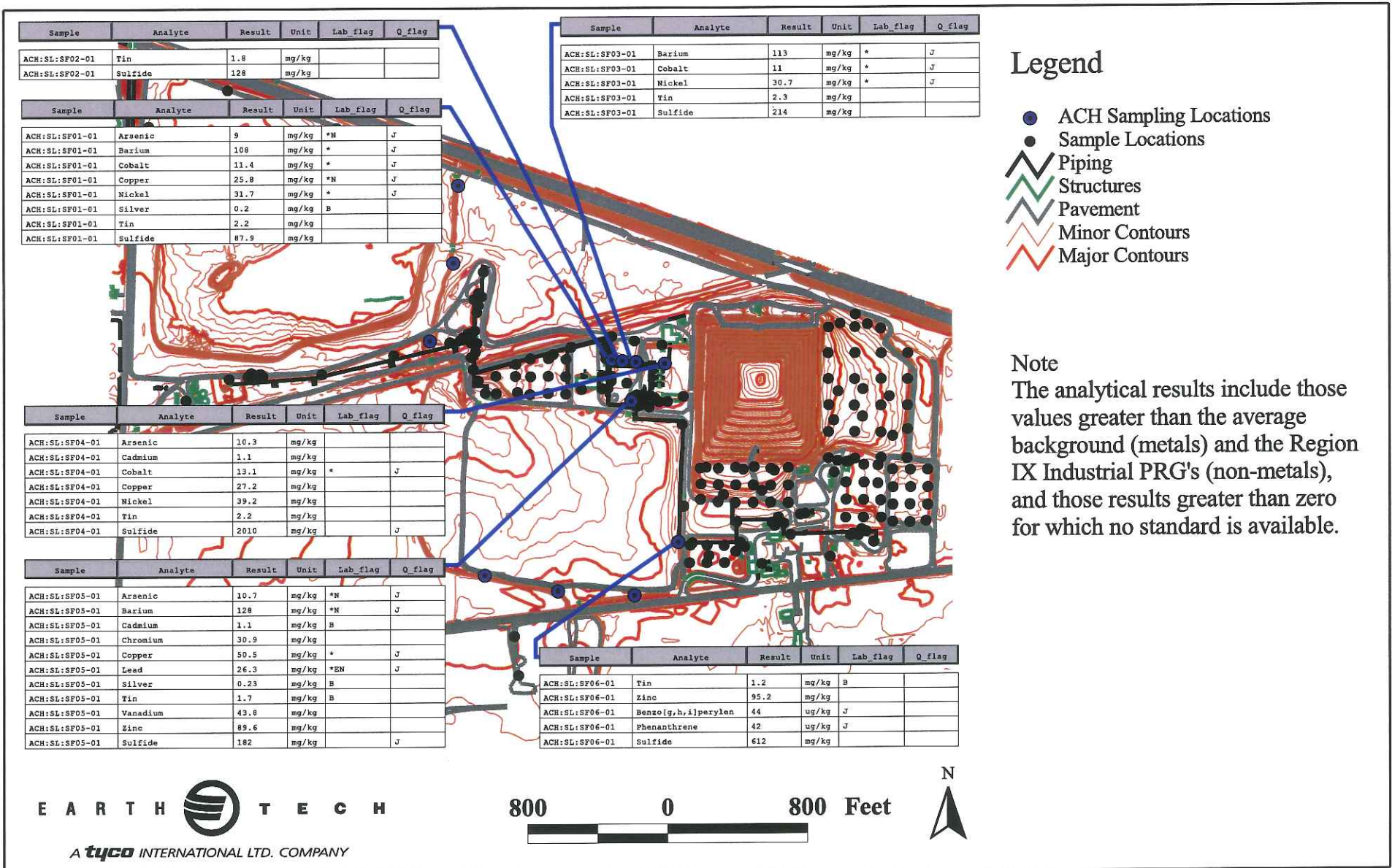


Figure 5-4.8b
Area of Concern H Analytical Results Map
Waste Management of Ohio - Vickery

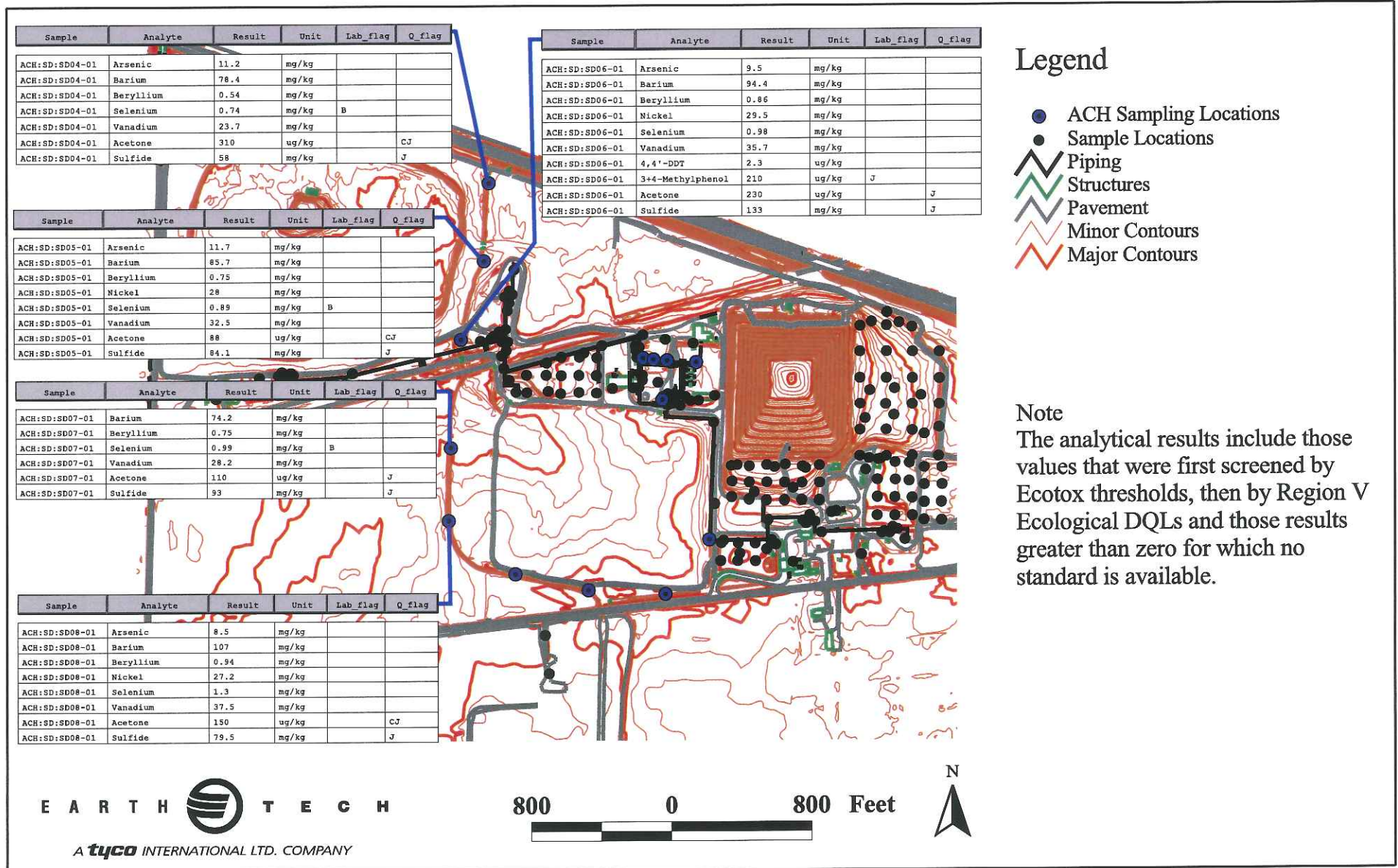


Figure 5-4.8c
Area of Concern H Analytical Results Map
Waste Management of Ohio - Vickery

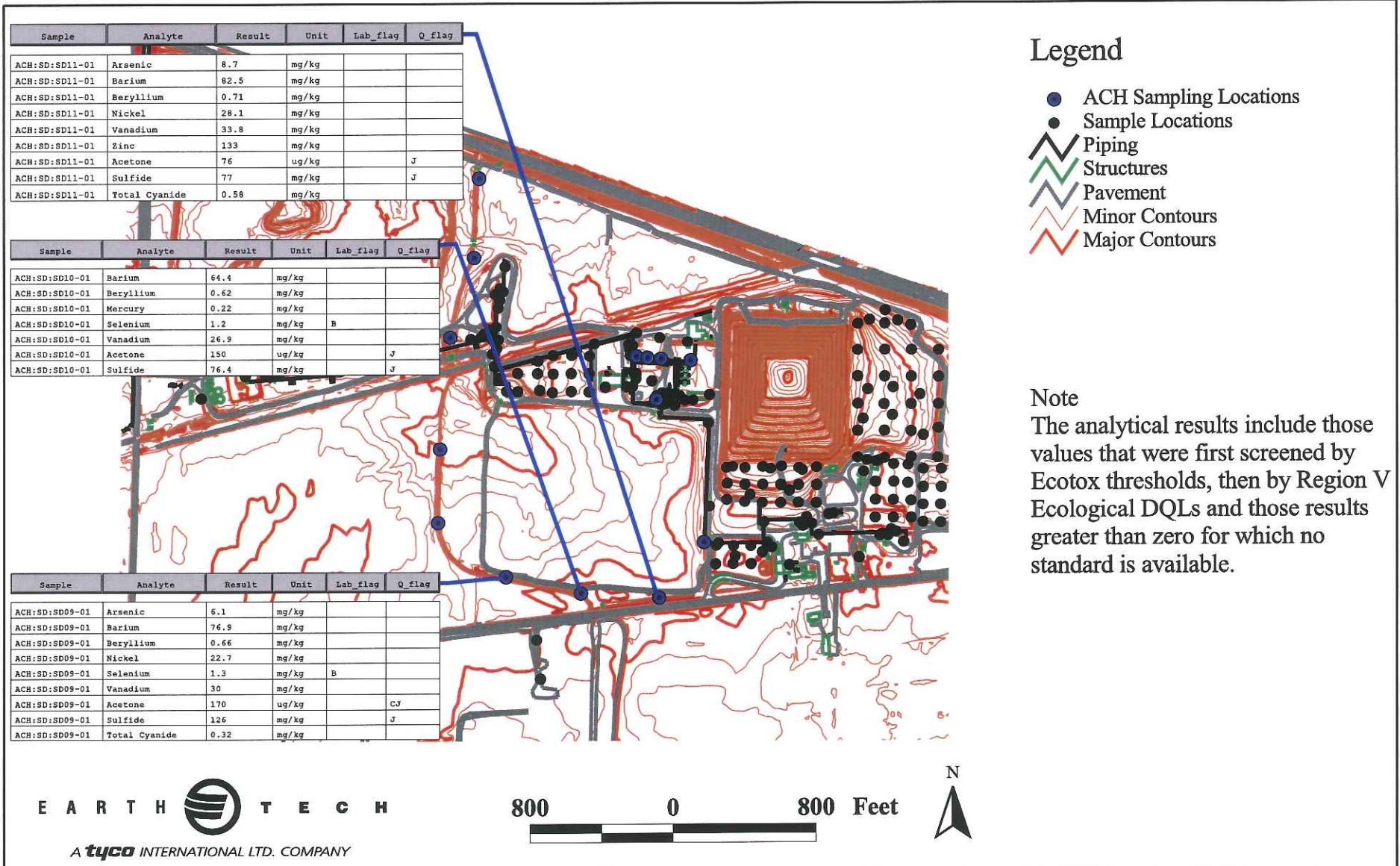


Figure 5-4.8d
Area of Concern H Little Raccoon Creek Analytical Results Map
Waste Management of Ohio - Vickery

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACH:SD:SD01-01	Arsenic	6.4	mg/kg		
ACH:SD:SD01-01	Barium	73	mg/kg		
ACH:SD:SD01-01	Beryllium	0.71	mg/kg		
ACH:SD:SD01-01	Nickel	22.9	mg/kg		
ACH:SD:SD01-01	Selenium	1.3	mg/kg	B	
ACH:SD:SD01-01	Vanadium	28.9	mg/kg		
ACH:SD:SD01-01	3+4-Methylphenol	220	ug/kg	J	
ACH:SD:SD01-01	Acetone	130	ug/kg		J
ACH:SD:SD01-01	Total Cyanide	0.61	mg/kg		

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACH:SD:SD02-01	Barium	51.2	mg/kg		
ACH:SD:SD02-01	Beryllium	0.45	mg/kg		
ACH:SD:SD02-01	Selenium	0.99	mg/kg	B	
ACH:SD:SD02-01	Vanadium	19.1	mg/kg		
ACH:SD:SD02-01	Acetone	170	ug/kg		CJ

Sample	Analyte	Result	Unit	Lab_flag	Q_flag
ACH:SD:SD03-01	Barium	67.2	mg/kg		
ACH:SD:SD03-01	Beryllium	0.67	mg/kg		
ACH:SD:SD03-01	Nickel	22	mg/kg		
ACH:SD:SD03-01	Selenium	1.1	mg/kg	B	
ACH:SD:SD03-01	Vanadium	27.6	mg/kg		
ACH:SD:SD03-01	Acetone	160	ug/kg		
ACH:SD:SD03-01	Sulfide	61.4	mg/kg		J

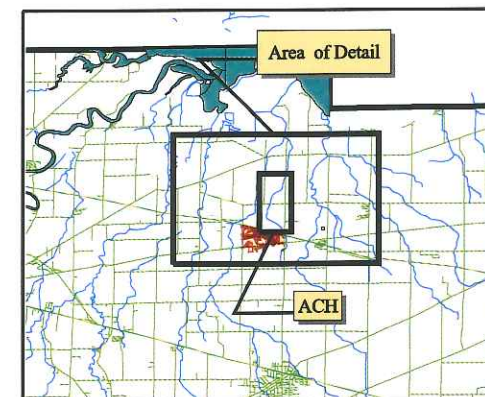
Legend

- ACH Sample Locations
- Ohio Rivers / Streams
- Sandusky County Streets
- WMO - Vickery

Note

The analytical results include those values that were first screened by Ecotox thresholds, then by Region V Ecological DQLs, and those results greater than zero for which no standard is available.

Key Map



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1 0 1 Miles



Figure 5-4.9
Area of Concern I Analytical Results Map
Waste Management of Ohio - Vickery

